User's Manual

AXFA14G/C
Magnetic Flowmeter Remote Converter
[Hardware Edition/Software Edition]

ADMAG AXF™

AXF
Magnetic Flowmeter
Integral Flowmeter
[Software Edition]

IM 01E20C02-01E

vigilantplant.®

YOKOGAWA
Yokogawa Electric Corporation

IM 01E20C02-01E
10th Edition

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REVISION RECORD 1

1. INTRODUCTION

This instrument has been adjusted at the factory before shipment.

To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

NOTE

This manual describes the hardware and software configurations of the AXFA14 converter and the software configuration of the AXF integral flowmeter.

The contents of “basic operating procedures”, “parameter description”, “operation via BRAIN terminal (BT200)”, “operation via HART communicator”, and “actual operation” for the AXF integral flowmeter are the same as the AXFA14, see Chapter 5 to 9 in this manual.
For the hardware configuration of the AXF integral flowmeter, see the user’s manual of the AXF Integral Flowmeter/Remote Flowtube [Hardware Edition] (IM 01E20D01-01E).
For FOUNDATION Fieldbus protocol (Output Signal and Communication suffix code; -F), please refer to IM 01E20F02-01E.
For PROFIBUS PA protocol (Output Signal and Communication suffix code; -G), please refer to IM01E20F12-01E.

■ Regarding This User's Manual

- This manual should be provided to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights are reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors or omissions are found, please inform Yokogawa.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- Please note that this user's manual may not be revised for any specification changes, construction changes or operating part changes that are not considered to affect function or performance.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

NOTE

Please refer to manual IM 01E20D01-01E for information of the AXF Remote Flowtube.

■ Safety and Modification Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.
- The following safety symbol marks are used in this user's manual and instrument.

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

IMPORTANT

An IMPORTANT sign denotes that attention is required to avoid damage to the instrument or system failure.

NOTE

A NOTE sign denotes information necessary for essential understanding of operation and features.

⏚ Protective grounding terminal

⏚ Functional grounding terminal
(This terminal should not be used as a protective grounding terminal.)

~ Alternating current

⎓ Direct current

1.1 Using the Magnetic Flowmeter Safely

WARNING

(1) Installation
- Installation of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.
- The magnetic flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the magnetic flowmeter. When moving the magnetic flowmeter, always use a trolley and have at least two people carry it.
- When the magnetic flowmeter is processing hot fluids, the instrument itself may become extremely hot. Take sufficient care not to get burnt.
- Where the fluid being processed is a toxic substance, avoid contact with the fluid and avoid inhaling any residual gas, even after the instrument has been taken off the piping line for maintenance and so forth.
- Do not apply excessive weight, for example, a person stepping on the magnetic flowmeter.
- All procedures relating to installation must comply with the electrical code of the country where it is used.

(2) Wiring
- The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.
- When connecting the wiring, check that the supply voltage is within the range of the voltage specified for this instrument before connecting the power cable. In addition, check that no voltage is applied to the power cable before connecting the wiring.
- The protective grounding must be connected securely at the terminal with the ⏚ mark to avoid danger to personnel.

(3) Operation
- When opening the cover, wait for more than 10 minutes after turning off the power. Only expert engineer or skilled personnel are permitted to open the cover.
- Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work.
  Under extremely rare case, the infra-red switches may respond unexpectedly in such conditions as sticking ball of water or extraneous substances on the surface of display panel glass according to the principle of infra-red switch operation.
  Its probability rises in such cases as sticking rain water by storm or other similar situation and washing up work near flowmeter installation place.
  Either to illuminate or stop illuminating the infra-red switches by the flashlight may cause the mis-reaction.
  Refer to Chapter 6 “Menu P: Parameter Protection Items” and section “10.2.2” how to use the write protect function in detail.

(4) Maintenance
- Maintenance of the magnetic flowmeter should be performed by the trained personnel having knowledge of safety standard. No operator shall be permitted to perform any operations relating to maintenance.
- When opening the cover, wait for more than 10 minutes after turning off the power.
- Always conform to maintenance procedures outlined in this manual. If necessary, contact Yokogawa.

- Care should be taken to prevent the build up of dirt, dust or other substances on the display panel glass or data plate. If these surfaces do get dirty, wipe them clean with a soft dry cloth.

(5) Explosion Protected Type Instrument

- Magnetic flowmeters with the model name AXFA14C are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations.
  Be sure to read Chapter 12 “EXPLOSION PROTECTED TYPE INSTRUMENT” before handling the instruments. The description in Chapter 12 is prior to the other description in this user’s manual.
  For TIIS flameproof type instruments, be sure to read “INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT” at the end of this manual.
- Only trained persons use this instrument in the industrial location.
- The protective grounding ⏚ must be connected to a suitable IS grounding system.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

1.2 Warranty

- The terms of this instrument that are guaranteed are described in the quotation. We will make any repairs that may become necessary during the guaranteed term free of charge.
- Please contact our sales office if this instrument requires repair.
- If the instrument is faulty, contact us with concrete details about the problem and the length of time it has been faulty, and state the model and serial number. We would appreciate the inclusion of drawings or additional information.
- The results of our examination will determine whether the meter will be repaired free of charge or on an at-cost basis.

■ The guarantee will not apply in the following cases:

- Damage due to negligence or insufficient maintenance on the part of the customer.
- Problems or damage resulting from handling, operation or storage that violates the intended use and specifications.
- Problems that result from using or performing maintenance on the instrument in a location that does not comply with the installation location specified by Yokogawa.
- Problems or damage resulting from repairs or modifications not performed by Yokogawa or someone authorized by Yokogawa.
- Problems or damage resulting from inappropriate reinstallation after delivery.
- Problems or damage resulting from disasters such as fires, earthquakes, storms, floods, or lightning strikes and external causes.

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Company names and product names used in this material are registered trademarks or trademarks of their respective owners.

1.3 Combination Remote Flowtubes

IMPORTANT

- The AXFA14 Magnetic Flowmeter Converter should be used in combination with the following remote flowtubes:
  AXFA14□⇔AXF002□-P to AXF400□-P
  Other flowtubes (size 500 to 2600 mm) cannot be combined with the AXFA14 converter.
- If the converter combined with the AXF magnetic flowmeter remote flowtube is changed from the AXFA11 to AXFA14 or vice versa, the meter factor of the remote flowtube must be readjusted according to its flow calibration.

CAUTION

In case of combination with the explosion proof type remote flowtube (AXF□□□C-P) for ATEX, FM, CSA, IECEx, and TIIS certification, please see the manual IM 01E20D01-01E. The construction of the instrument, installation, external wiring, maintenance, and repair are strictly restricted, and non-observance or negligence of these restriction would result dangerous condition.

1.4 ATEX Documentation

This procedure is only applicable to the countries in European Union.

GB

All instruction manuals for ATEX Ex related products are available in English, German and French. Should you require Ex related instructions in your local language, you are to contact your nearest Yokogawa office or representative.

DK

Alle brugervejledninger for produkter relateret til ATEX Ex er tilgængelige på engelsk, tysk og fransk. Skulle De ønske yderligere oplysninger om håndtering af Ex produkter på eget sprog, kan De rette henvendelse herom til den nærmeste Yokogawa afdeling eller forhandler.

I

Tutti i manuali operativi di prodotti ATEX contrassegnati con Ex sono disponibili in inglese, tedesco e francese. Se si desidera ricevere i manuali operativi di prodotti Ex in lingua locale, mettersi in contatto con l'ufficio Yokogawa più vicino o con un rappresentante.

E

Todos los manuales de instrucciones para los productos antiexplosivos de ATEX están disponibles en inglés, alemán y francés. Si desea solicitar las instrucciones de estos artículos antiexplosivos en su idioma local, deberá ponerse en contacto con la oficina o el representante de Yokogawa más cercano.

NL

Alle handleidingen voor producten die te maken hebben met ATEX explosiebeveiliging (Ex) zijn verkrijgbaar in het Engels, Duits en Frans. Neem, indien u aanwijzingen op het gebied van explosiebeveiliging nodig hebt in uw eigen taal, contact op met de dichtstbijzijnde vestiging van Yokogawa of met een vertegenwoordiger.

SF

Kaikkien ATEX Ex -tyyppisten tuotteiden käyttöhjeet ovat saatavilla englannin-, saksan- ja ranskankielisinä. Mikäli tarvitsette Ex -tyyppisten tuotteiden ohjeita omalla paikallisella kielellännne, ottakaa yhteyttä lähimpään Yokogawa-toimistoon tai -edustajaan.

P

Todos os manuais de instruções referentes aos produtos Ex da ATEX estão disponíveis em Inglês, Alemão e Francês. Se necessitar de instruções na sua língua relacionadas com produtos Ex, deverá entrar em contacto com a delegação mais próxima ou com um representante da Yokogawa.

F

Tous les manuels d'instruction des produits ATEX Ex sont disponibles en langue anglaise, allemande et française. Si vous nécessitez des instructions relatives aux produits Ex dans votre langue, veuillez bien contacter votre représentant Yokogawa le plus proche.

D

Alle Betriebsanleitungen für ATEX Ex bezogene Produkte stehen in den Sprachen Englisch, Deutsch und Französisch zur Verfügung. Sollten Sie die Betriebsanleitungen für Ex-Produkte in Ihrer Landessprache benötigen, setzen Sie sich bitte mit Ihrem örtlichen Yokogawa-Vertreter in Verbindung.

S

Alla instruktionsböcker för ATEX Ex (explosionssäkra) produkter är tillgängliga på engelska, tyska och franska. Om Ni behöver instruktioner för dessa explosionssäkra produkter på annat språk, skall Ni kontakta närmaste Yokogawakontor eller representant.

GR

Όλα τα εγχειρίδια λειτουργίας των προϊόντων με ATEX Ex διατίθενται στα Αγγλικά, Γερμανικά και Γαλλικά. Σε περίπτωση που χρειάζεστε οδηγίες σχετικά με Ex στην τοπική γλώσσα παρακαλούμε επικοινωνήστε με το πλησιέστερο γραφείο της Yokogawa ή αντιπρόσωπο της.

SK

Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom, nemeckom a francúzskom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

CZ

Všechny uživatelské příručky pro výrobky, na něž se vztahuje nevýbušné schválení ATEX Ex, jsou dostupné v angličtině, němčině a francouzštině. Požadujete-li pokyny týkající se výrobků s nevýbušným schválením ve vašem lokálním jazyku, kontaktujte prosím vaši nejbližší reprezentační kancelář Yokogawa.

LT

Visos gaminiø ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglø, vokieèiø ir prancûzø kalbomis. Norëdami gauti prietaisø Ex dokumentacijà kitomis kalbomis susisiekite su artimiausiu bendrovës “Yokogawa” biuru arba atstovu.

LV

Visas ATEX Ex kategorijas izstrâdâjumu Lietoðanas instrukcijas tiek piegâdâtas angïu, vâcu un franèu valodâs. Ja vçlaties saòemt Ex ierîèu dokumentâciju citâ valodâ, Jums ir jâsazinâs ar firmas Jokogava (Yokogawa) tuvâko ofisu vai pârstâvi.

EST

Kõik ATEX Ex toodete kasutamisjuhendid on esitatud inglise, saksa ja prantsuse keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima Iokagava (Yokogawa) kontori või esindaja poole.

PL

Wszystkie instrukcje obsługi dla urządzeń w wykonaniu przeciwwybuchowym Ex, zgodnych z wymaganiami ATEX, dostępne są w języku angielskim, niemieckim i francuskim. Jeżeli wymagana jest instrukcja obsługi w Państwa lokalnym ję zyku, prosimy o kontakt z najbliższym biurem Yokogawy.

SLO

Vsi predpisi in navodila za ATEX Ex sorodni pridelki so pri roki v angliš èini, nemš èini ter francoš èini. È e so Ex sorodna navodila potrebna v vašem tukejnjem jeziku, kontaktirajte vaš najbliši Yokogawa office ili predstaunika.

H

Az ATEX Ex mûszerek gépkönyveit angol, német és francia nyelven adjuk ki. Amennyiben helyi nyelven kérik az Ex eszközök leírásait, kérjük keressék fel a legközelebbi Yokogawa irodát, vagy képviseletet.

BG

Всички упътвания за продукти от серията ATEX Ex се предлагат на английски, немски и френски език. Ако се нуждаете от упътвания за продукти от серията Ex на родния ви език, се свържете с най-близкия офис или представителство на фирма Yokogawa.

RO

Toate manualele de instructiuni pentru produsele ATEX Ex sunt in limba engleza, germana si franceza. In cazul in care doriti instructiunile in limba locala, trebuie sa contactati cel mai apropiat birou sau reprezentant Yokogawa.

M

Il-manwali kollha ta’ l-istruzzjonijiet għal prodotti marbuta ma’ ATEX Ex huma disponibbli bl-Ingliż, bil-Ġermaniż u bil-Franċiż. Jekk tkun teħtieġ struzzjonijiet marbuta ma’ Ex fil-lingwa lokali tiegħek, għandek tikkuntattja lill-eqreb rappreżentan jew uffiċċju ta’ Yokogawa.

2. HANDLING PRECAUTIONS

This instrument has been inspected carefully at the factory before shipment. When the instrument is delivered, visually check that no damage has occurred during transportation.

Read this section carefully as it contains important information on handling this instrument. Refer to the relevant sections for information not contained in this section. If you have any problems or questions, please contact Yokogawa sales office.

2.1 Checking Model and Specifications

The model code and specifications are found on the data plate located on the outside of the case. Check that the model code and specifications match what you have ordered.

Be sure you have your model number and serial number available when contacting Yokogawa.

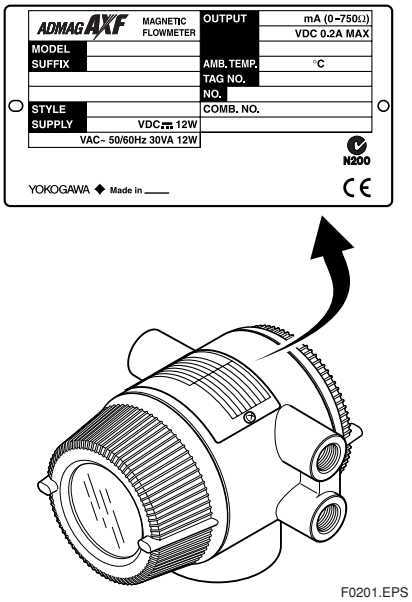


Figure 2.1.1 Data Plate

2.2 Accessories

Check that the parts shown below are included in the package:

- Mounting hardware: 1 set
- Hexagonal wrench: 1 piece (nominal size 3 mm)

2.3 Storage Precautions

If the instrument is to be stored for a long period of time after delivery, observe the following points.

- The instrument should be stored in its original packing condition in the storage location.
- Select a storage location that fulfils the following conditions:
  - A place where it will not be exposed to rain or water
  - A place subject to minimal vibrations or shocks
  - Temperature and humidity levels should be as follows:
    Temperature: -30 to 70°C
    Humidity: 5 to 80% RH (no condensation)
    The preferred ambient temperature and humidity levels are 25°C and approximately 65% RH.
- If the AXFA14 converter is transferred to the installation site and stored without being installed, its performance may be impaired due to the infiltration of rainwater and so forth. Be sure to install and wire the AXFA14 as soon as possible after transferring it to the installation location.

2.4 Installation Location Precautions

Select the installation location with consideration to the following items to ensure long-term stable operation of the instrument.

■ **Ambient Temperature:**
Avoid installing the instrument in locations with constantly fluctuating temperatures. If the location is subject to radiant heat from the plant, provide heat insulation or improve ventilation.

■ **Atmospheric Condition:**
Avoid installing the instrument in a corrosive atmosphere. In situations where this is unavoidable, consider ways to improve ventilation and to prevent rainwater from entering and being retained in the conduit pipes.

■ **Vibrations or Shocks:**
Avoid installing the instrument in a place subject to shocks or vibrations.

■ **Explosion protected type:**
Explosion protect types can be installed in hazardous areas according to the types of gases for which they are certified. See the description in Chapter 12 “EXPLOSION PROTECTED TYPE INSTRUMENT” and “INSTALLATION AND OPERATING PRECAUTION FOR TIIS FLAMEPROOF EQUIPMENT” in this user's manual.

3. INSTALLATION

WARNING

Installation of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.

3.1 Installation Location

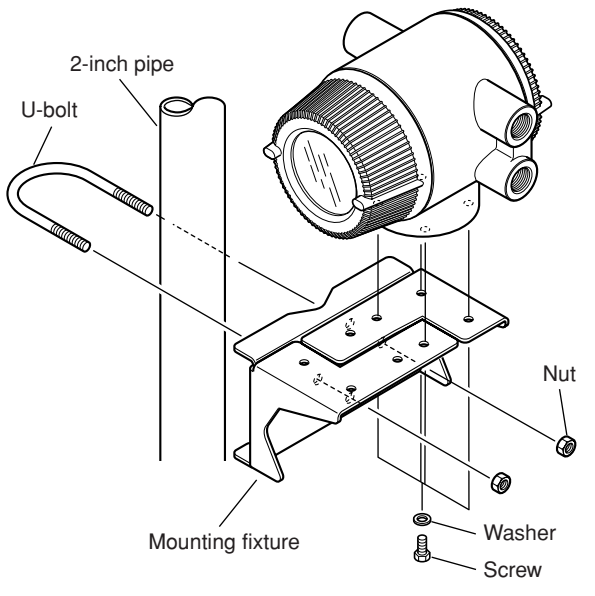
IMPORTANT

Install the instrument in a location where it is not exposed to direct sunlight. For ambient temperature, refer to Chapter 11 “OUTLINE”.
The instrument may be used in an ambient humidity where the RH ranges from 0 to 100%. However, avoid long-term continuous operation at relative humidity above 95%.

3.2 Mounting

This instrument can be mounted on a 2-inch pipe in a vertical or horizontal position depending on the installation site.

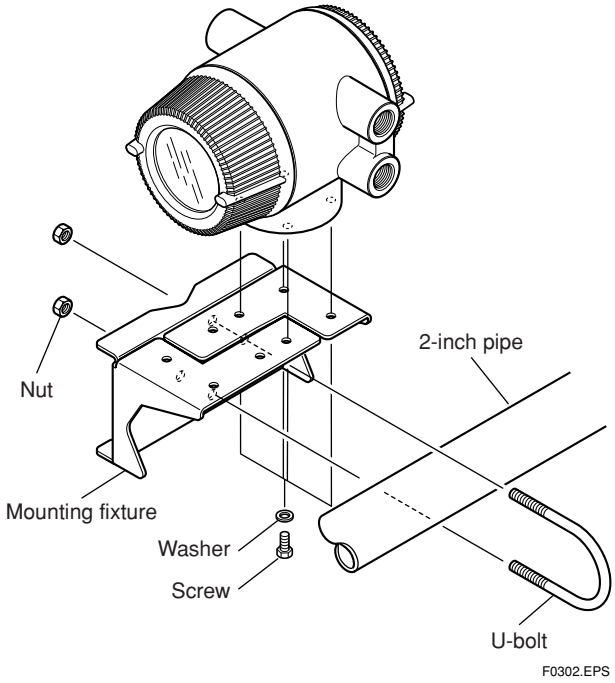
● Vertical Mounting



F0301.EPS

1. Fix the instrument on the mounting fixture using four screws.
2. Fix the mounting fixture with the instrument installed on a 2-inch pipe using a U-bolt.

● Horizontal Mounting



F0302.EPS

1. Fix the instrument casing on the mounting fixture using four screws.
2. Fix the mounting fixture with the instrument installed on a 2-inch pipe using a U-bolt.

Figure 3.2.1 2-inch Pipe Mounting

4. WIRING

This chapter describes the wiring on the converter side only. For information relating to wiring on the flowtube side, refer to the user's manual of the AXF Remote Flowtube (IM 01E20D01-01E).

WARNING

The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.

CAUTION

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

4.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

CAUTION

- In cases where the ambient temperature exceeds 50°C (122°F), use external heat-resistant wiring with a maximum allowable temperature of 70°C (158°F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables must be routed in separate steel conduit tubes 16 (JIS C 8305) or flexible conduit tubes 15 (JIS C 8309).
- Always route the power and output signal cables in separate steel conduit tubes, except when the power supply voltage is 24 V and four-core cables are used for wiring. Keep conduits or flexible tubes watertight using sealing tape.
- Ground the remote flowtube and the converter separately.
- Cover each shield of the signal cable with vinyl tube or vinyl tape to avoid contact between two shields or between a shield and a case.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- In case of 24V power supply version, it comes with a plug. Use this plug to cover the unused wiring port when wiring the instrument with only one, four-core cable.
- Be sure to turn power off before opening the cover.
- Before turning the power on, tighten the cover securely.
- The terminal box cover is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw, refer to Figure 4.4.1.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw, refer to Figure 4.4.12.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.

4.2 Cables

(1) Dedicated Signal Cable (AXFC)

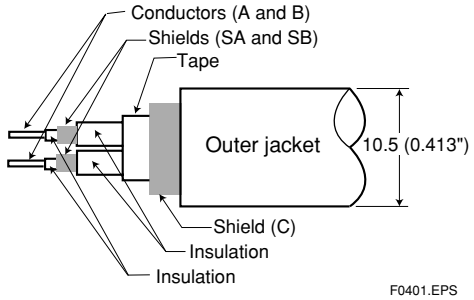


Figure 4.2.1 Dedicated Signal Cable AXFC

The flow signal is transmitted via this dedicated cable. The cable is constructed with double shielding over the two conductors, and heat-resistant vinyl is used for the outer jacket material.

Finished diameter: 10.5 mm (0.413")
Maximum length: 100 m (330 ft)
Maximum temperature: 80°C (176°F)

IMPORTANT

If the cable is longer than required, cut off any extra length rather than coiling it up, and terminate the conductors as shown in Figure 4.2.2. Avoid using junction terminal boards to extend the cable length, as this will interrupt the shielding.

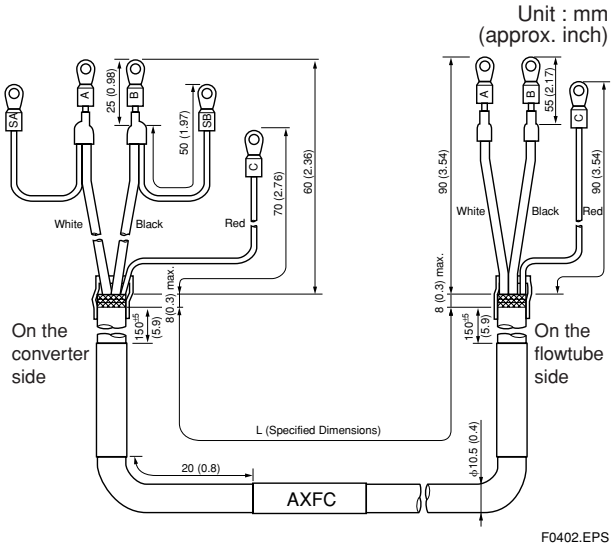


Figure 4.2.2 Treatment of Dedicated Signal Cables

CAUTION

- As crimp terminals A, B, SA, SB and C have their own electrical potentials, securely insulate them so as not to come in contact with one another.
- To prevent a shield from coming in contact with another shield or the case, cover each shield with a vinyl tube or wrap it in vinyl tape.

NOTE

Conductors A and B carry the signal from the electrodes, and C is at the potential of the liquid (signal common). Shields SA and SB are kept at the same potentials as the individual electrodes (these are actively driven shields.) This is done to reduce the effect of the distributed capacitance of the cable at long cable length. Note that, since the signals from the individual electrodes are impedance converted inside the converter, errors will result if they come in contact with any other component. Great care must be taken in the cable end treatment.

(2) Excitation Cable/Power Cable/Output Cable

JIS C3401 control cable equivalent
JIS C3312 power cable equivalent
14 AWG Belden 8720 equivalent

Outer Diameter:
With no gland option;
6.5 to 12 mm (0.26 to 0.47 in.)
With gland options EG, EU and EW;
10.5 or 11.5 mm (0.41 or 0.45 in.)
With gland options EP;
6 to 12 mm (0.24 to 0.47 in.)
Nominal Cross Section:
Single wire; 0.5 to 2.5 mm^2
Stranded wire; 0.5 to 1.5 mm^2

In case of power cable, Green/Yellow covered conductor shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS. Conform to IEC227, IEC245 or equivalent national authorization.

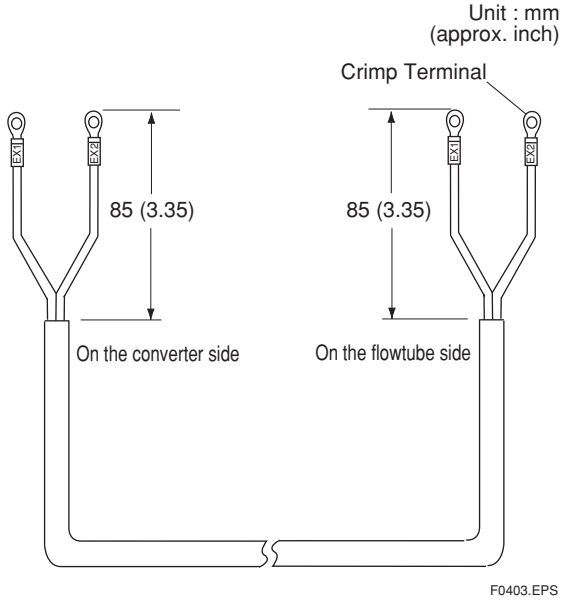


Figure 4.2.3 End Treatment of Excitation Cable

NOTE

- For excitation and power cables, always use a crimp terminal with an insulation cover.
- Use crimp tools from the manufacturer of the crimp terminal you want to use to connect the crimp terminal and cable.
- Use crimp tools that are appropriate for the diameter of the cable to be connected.

4.3 Wiring Ports

This instrument is of watertight construction as stipulated in JIS C0920. It is shipped with a wiring bracket (waterproof gland or waterproof gland with union) or a plastic gland attached, only in cases where an optional specification is selected for the wiring port. In case of the explosion proof type, refer to chapter 12.

IMPORTANT

The wiring port is sealed with a cap (not water-proof). Do not remove the cap from the unused wiring port. If waterproof property is necessary, please use waterproof glands.

(1) When waterproof property is unnecessary (When there are no particular optional specifications)

The wiring port is sealed with a cap (not water-proof) that must be removed before wiring. At this time, handle the wiring port in accordance with the JIS C0920 mentioned above. Do not remove the cap from the unused wiring port.

(2) When waterproof property is necessary (Wiring using waterproof glands)

IMPORTANT

To prevent water or condensation from entering the converter housing, waterproof glands are recommended. Do not over-tighten the glands or damage to the cables may result. Tightness of the gland can be checked by confirming that the cable is held firmly in place.

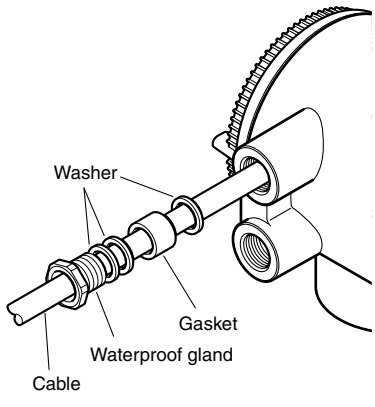


Figure 4.3.1 Waterproof Gland (Optional code EG)

For working on the electric wire tubes or the flexible tubes (PF1/2), remove the waterproof gland and attach them directly to the wiring port.

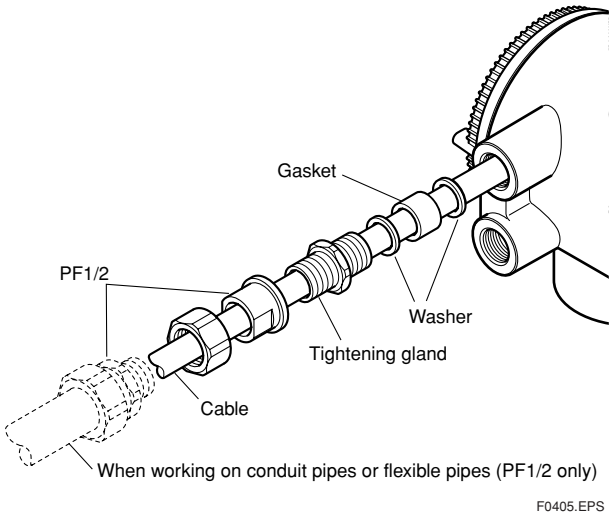


Figure 4.3.2 Waterproof Gland with Union Joint (Optional code EU)

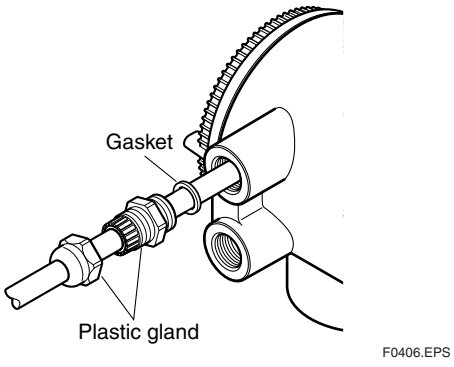


Figure 4.3.3 Plastic Gland (Optional code EP)

(3) Conduit Wiring

When wiring the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.3.4. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

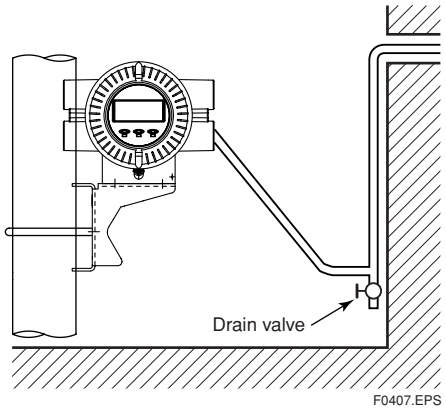


Figure 4.3.4 Conduit Wiring

4.4 Wiring Connections

4.4.1 Removing Cover

Loosen cover locking screw 2 clockwise using a hexagonal wrench (nominal size 3 mm) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is unlocked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

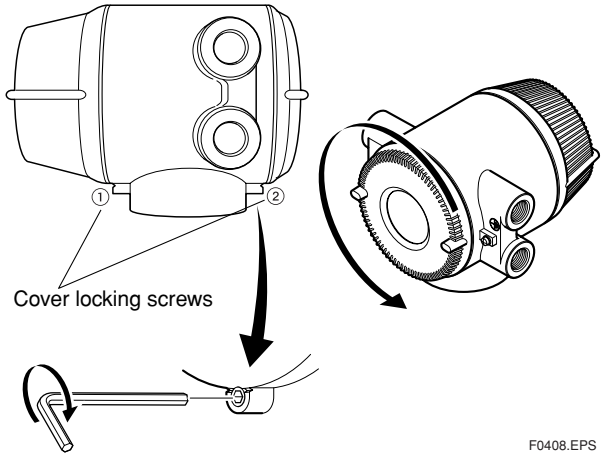


Figure 4.4.1 Removing the Terminal Box Cover

4.4.2 Terminal Configuration

When the cover is removed, the connection terminals will be visible. The terminal configuration labels are attached in the locations shown in Figure 4.4.2.

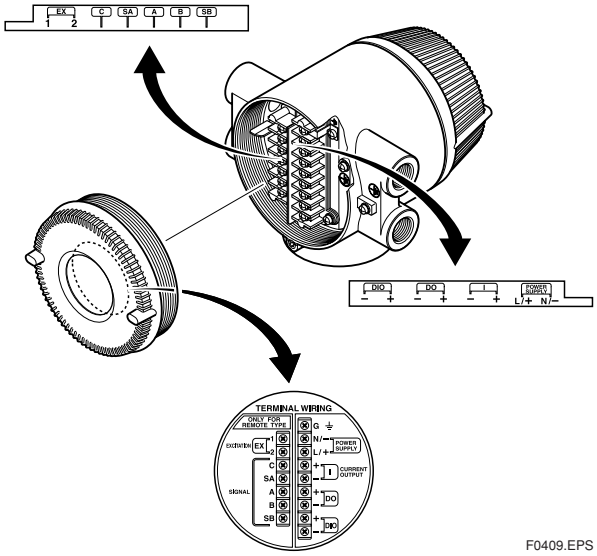


Figure 4.4.2 Terminal Layout Labels Position

The description of the terminal symbols is shown in Table 4.1.1.

For FOUNDATION Fieldbus protocol, please refer to IM 01E20F02-01E.

For PROFIBUS PA protocol, please refer to IM 01E20F12-01E.

Table 4.1.1 Terminal Symbols

Terminal Symbols	Description
EX1 EX2	Excitation current output
C SA A B SB	Flow singal input

Terminal Symbols	Description
⏚	Functional grounding
N/– L/+	Power supply
I+ I–	Current output 4 to 20mA DC
DO+ DO–	Pulse output/ Alarm output/ Status output
DIO+ DIO–	Alarm output/ Status output/ Status input
⏚	Protective grounding (Outside of the terminal)

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4.4.3 Precautions for Wiring of Power Supply Cables

When connecting to the power supply, observe the points below. Failure to comply with these warnings may result in an electric shock or damage to the instrument.

WARNING

- Ensure that the power supply is OFF in order to prevent electric shocks.
- Ensure the protective grounding terminal is grounded before turning the power on.
- Use insulating sleeve crimp terminals (for 4-mm screws) for the power supply wiring and protective grounding wiring.
- Install an external switch or circuit breaker as a means to turn the powe off (capacitance; 15A, conforming to IEC947-1 and IEC947-3). Locate this switch either near the instrument or in other places facilitating easy operation. Affix a "Power Off Equipment" label to this external switch or circuit breaker.

Wiring Procedure

1. Turn the instrument's power off.
2. Wire the power supply cable and the functional grounding cable to the power supply terminals.

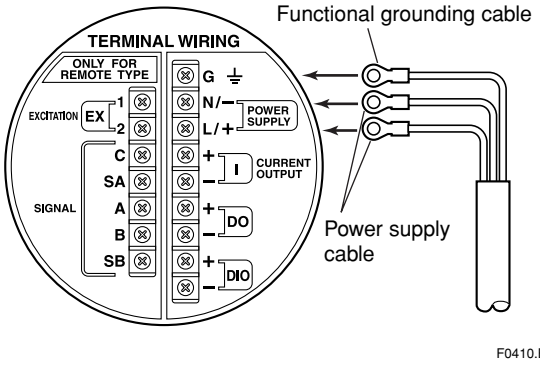


Figure 4.4.3 Electric Cable Wiring

4.4.4 DC Power Connection

When using DC power as the power supply for the converter, give attention to the following points.

(1) Connecting Power Supply

IMPORTANT

Do not connect power supply with reversed polarities.
L/+ terminal: connect +
N/– terminal: connect –

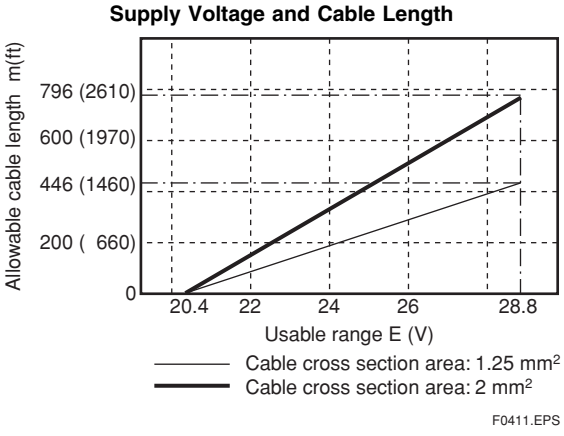
IMPORTANT

Do not connect power supply with 100 to 240 V AC or 100 to 120 V DC in the case of a 24 V power supply version (power supply code 2). It will give a damage to the converter.

(2) Required Power Supply Voltages

IMPORTANT

When using a 24 V power supply, the specification for the supply voltage is 24 V (–15% to +20%), but the input voltage of the converter drops due to cable resistance therefore it must be used within the following ranges.



(3) Setting Power Supply Frequency

IMPORTANT

Set the local Commercial power frequency in order to eliminate the effect of induction noise from the Commercial power supply.
Refer to "Chapter 6: Parameter Description" in this manual.
Parameter No.: **J30** and **J31**

4.4.5 Grounding

CAUTION

Be sure to connect the protective grounding of the AXFA14 with a cable of 2mm^2 or larger cross section in oder to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.
Connect the grounding wire to the ⏚ mark.
The grounding should satisfy Class D requirements (ground resistance, 100 Ω or less).
In case of TIIS Flameproof type, the grounding should satisfy Class C requirements (ground resistance, 10 Ω or less) or class A requirements (ground resistance, 10 Ω or less).
For explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.

IMPORTANT

When optional code A (lighting protector) is selected, the ground should satisfy Class C requirements (grounding resistance, 10 Ω or less).

- The protective grounding terminals ⏚ are located on the inside and outside of the terminal area. Either terminal may be used.
- Use 600V vinyl insulation wires as the grounding wires.

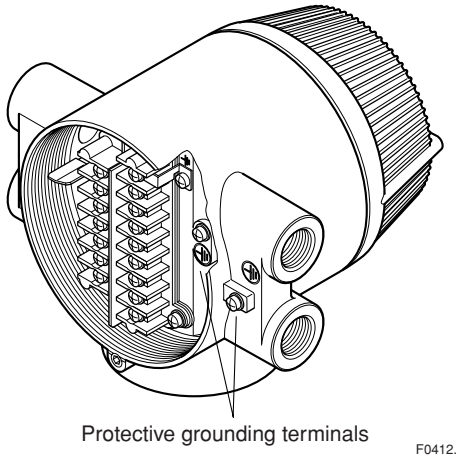


Figure 4.4.4 Protective Grounding Terminal Location

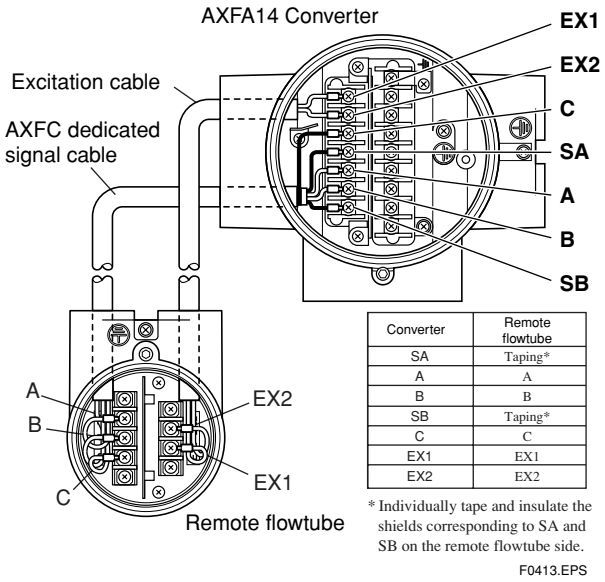
4.4.6 Wiring the Remote Flowtube with the AXFA14 Converter

WARNING

Before wiring, be sure that the power supply for AXFA14 converter has been turned off to prevent an electrical shock.

(1) Connection with the Remote Flowtube (General-Purpose Use, Submersible Type, Sanitary Type, Size 2.5 to 400 mm (0.1 to 16 in.))

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.4.5 Wiring Diagram

(2) Connection with the Remote Flowtube (Explosion proof Type, Size 2.5 to 400 mm (0.1 to 16 in.))

In case of explosion proof type for ATEX, FM, CSA, IECEx and TIIS certification, connect wiring as shown in the figure below.

In case of the explosion proof type, the protective grounding ⏚ of remote flowtube must be connected to a suitable IS grounding system. In that case, ⏚ (functional grounding terminal) need not be connected.

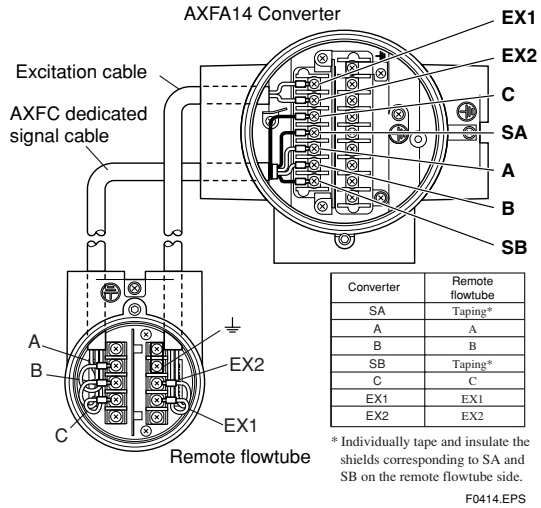


Figure 4.4.6 Wiring Diagram

4.4.7 Connecting to External Instruments

WARNING

Before wiring with external instruments, be sure to turn off the power supply for AXFA14 converter and any external instruments.

Connect the AXFA14 terminal to external instruments, giving attention to the following points.

For FOUNDATION Fieldbus protocol, please refer to IM 01E20F02-01E.

For PROFIBUS PA protocol, please refer to IM 01E20F12-01E.

● 4 to 20 mA DC Current Output

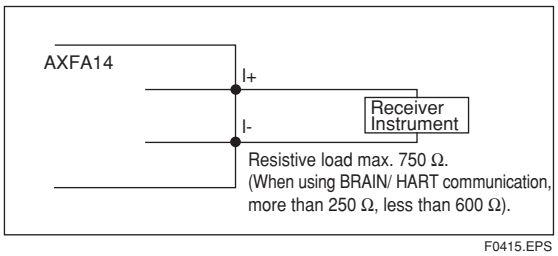


Figure 4.4.7 4 to 20 mA DC Output Connection

● Pulse Output

IMPORTANT

- As this is a transistor contact (insulated type), give attention to proper voltage and polarity when wiring.
- Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.
- When input filter constant of the electronic counter is large in relation to the pulse width, the signal will decrease and the count will not be accurate.
- If the input impedance of the electronic counter is large, an induction noise from the power supply may result in inaccurate counts. Use a shield cable or sufficiently reduce the input impedance of the electronic counter within the electromagnetic flowmeter pulse output specification range.
- The active pulse output (Optional code EM) cannot be used in conjunction with the standard pulse output.
- When the active pulse output (Optional code EM) is selected, do not be short-circuit between the DO+ and DO– terminals to avoid damaging the instrument.
- When the active pulse output (Optional code EM) is selected, the range of pulse rate must be set to 2 pps maximum.
- To avoid communication (BRAIN/ HART) failure, it is recommended to use the shield cable.

NOTE

For pulse output from the DO terminals, parameters must be set. Refer to “Chapter 6: Parameter Description” in this manual.

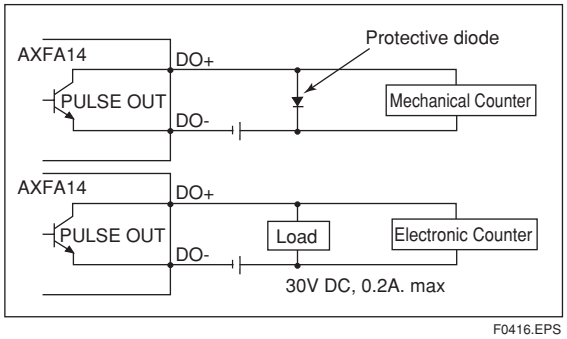


Figure 4.4.8 Pulse Output Connection

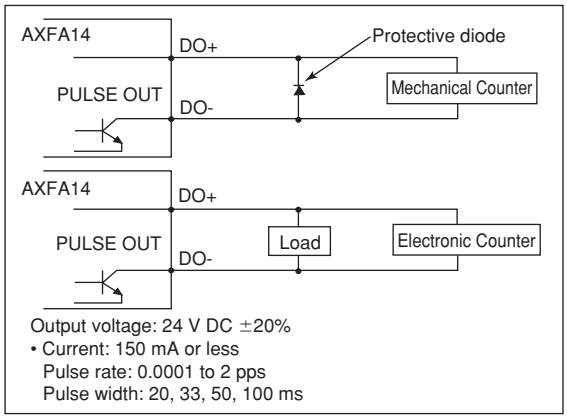


Figure 4.4.9 Active Pulse Output Connection (Optional code EM)

● Status Input

IMPORTANT

Status inputs are designed for use with no-voltage (dry) contacts. Be careful not to connect the status to any signal source carrying voltage. Applying voltage may damage the input circuit.

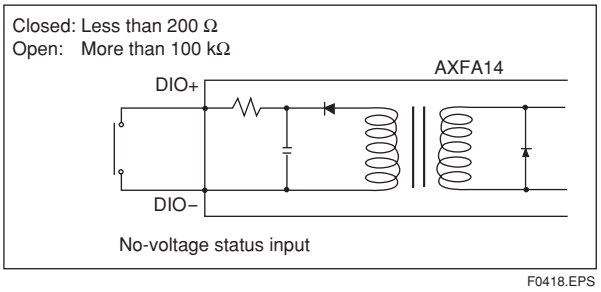


Figure 4.4.10 Status Input Connection

NOTE

For status input to the DIO terminals, parameters must be set. Refer to “Chapter 6: Parameter Description” in this manual.

● Status Output / Alarm Output

IMPORTANT

Since this is an isolated transistor output, be careful of voltage and polarity when wiring. Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.

This output cannot switch an AC load. To switch an AC load, an intermediate relay must be inserted as shown in Figure 4.4.11.
*The alarm output operates from open (normal) to closed (alarm occurrence) in the default value (as setup upon plant shipment). Changes can be made via the parameter settings.

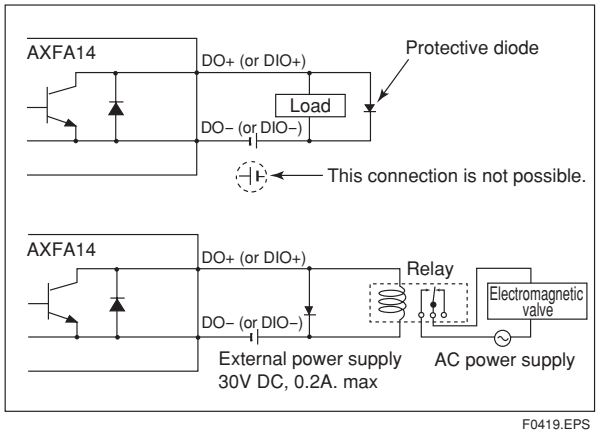


Figure 4.4.11 Status Output/Alarm Output Connection

NOTE

For status and alarm outputs from the DO or DIO terminals, parameters must be set. Refer to “Chapter 6: Parameter Description” in this manual.

4.4.8 Installing the Cover

Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 2 counterclockwise using a hexagonal wrench (nominal size 3 mm) to lock the cover.

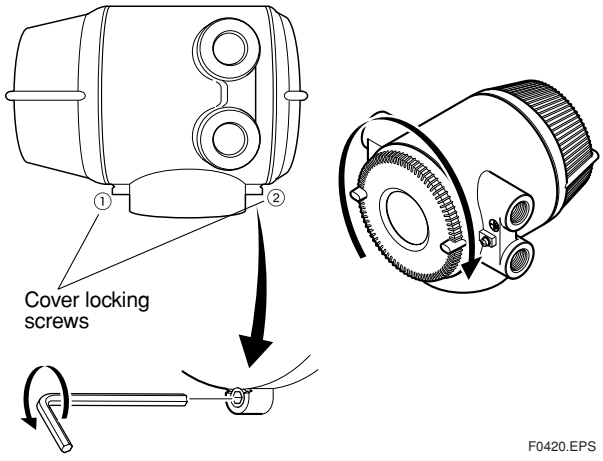


Figure 4.4.12 Installing the Terminal Box Cover

5. BASIC OPERATING PROCEDURES (USING THE DISPLAY UNIT)

The modification of data settings from the display unit can be carried out using the three setting switches (infra-red switches) - namely, the SET, SHIFT, and switches. The infra-red switches enable the user to set parameters without opening the cover.
This chapter will provide a description of basic data configuration and the methods to be used with the three setting switches. The AXFA14 or the AXF integral flowmeter can also be operated using a handheld Brain Terminal (BT200) or a HART Communicator. (Please refer to Chapter 7 for operation via Brain Terminal and Chapter 8 for operation via HART Communicator.)

For FOUNDATION Fieldbus protocol, please refer to IM 01E20F02-01E.

For PROFIBUS PA protocol, please refer to IM 01E20F12-01E.

WARNING

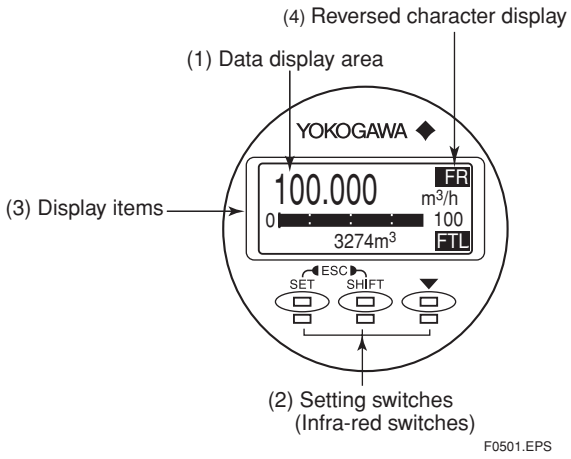
Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work.
Under extremely rare case, the infra-red switches may respond unexpectedly in such conditions as sticking ball of water or extraneous substances on the surface of display panel glass according to the principle of infra-red switch operation.
Its probability rises in such cases as sticking rain water by storm or other similar situation and washing up work near flowmeter installation place.
Either to illuminate or stop illuminating the infra-red switches by the flashlight may cause the mis-reaction.
Refer to Chapter 6 “Menu P: Parameter Protection Items” and section “10.2.2” how to use the write protect function in detail.

IMPORTANT

Operate the display unit under the condition where direct sunlight, etc... do not shine to the setting switches directly when the parameter setting operation is carried out.

NOTE

(1) Always use the setting switches with the cover of the AXFA14 or the AXF integral flowmeter closed.
(2) Use these switches with them covered by the glass window.
(3) If dirt, dust or other substances surfaces on the display panel glass, wipe them clean with a soft dry cloth.
(4) The operation with dirty gloves may cause a switch response error.



5.1 Operating Panel Configuration and Functions

(1) Data display area

1st line (Display Select1), 2nd line (Display Select2), and 3rd line (Display Select3) can be displayed using parameter settings. The content corresponding to selected item is shown with the reversed-character on the right of the line.

(2) Setting switch operations

SET: Move the layer down, select, and confirm

SHIFT + SET: Move the layer up
(Press the SET switch while holding down the SHIFT switch)

▼: Move the cursor down (for selection-type parameters) or increase values (for numeric-type parameters)

SHIFT: Move the cursor to the right (for numeric-type parameters)

SHIFT + ▼: Move the cursor up (for selection-type parameters)

(3) Display items

Displayed items and reversed-character indication		Content	Disp Select1	Disp Select2 Disp Select3
Instantaneous flow rate: %	FR	Displays the instantaneous flow rate for the span as a percentage.	○	○
Actual instantaneous flow rate	FR	Displays the actual reading for instantaneous flow rate.	○	○
Instantaneous flow rate: mA	FR	Displays the instantaneous flow rate for the span as a current output value.	○	○
Bar graph indicating instantaneous flow rate	None	Displays the instantaneous flow rate for the span as a percentage using bar graph.	×	○
Totalized forward-direction flow rate	FTL	Displays the totalized value for flow rate in the forward direction.	○	○
Totalized reverse-direction flow rate	RTL	Displays the totalized value for flow rate in the reverse direction.	○	○
Totalized differential flow rate	DTL	Displays the differential totalized value for flow rate between forward totalization and reverse totalization.	○	○
Tag number	TAG	Display the tag number (using up to 16 characters).	×	○
Diagnosis of electrode adhesion	ADH	Displays the adhesion condition in the form of a bar graph. (See the description for parameters K10 through K15 from Chapter 6: Parameter Description for more details.)	×	○
Communication type	COM	Displays the communication type.	×	○

(4)

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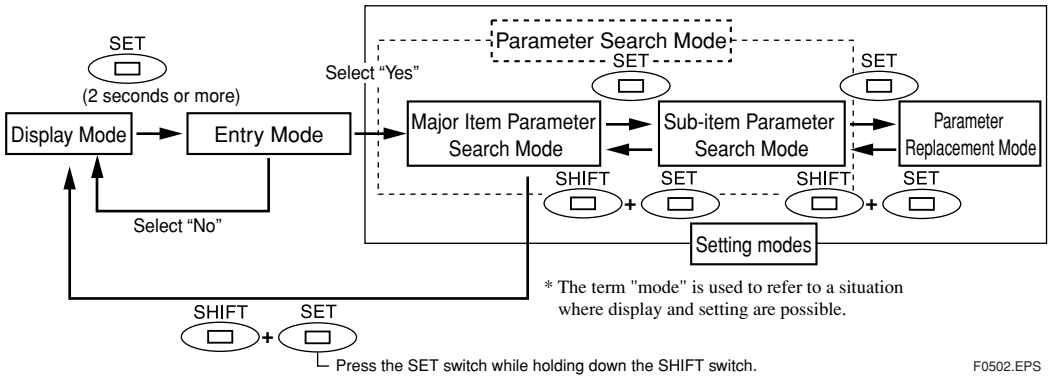
5.2 Display Unit Setting Methods

NOTE

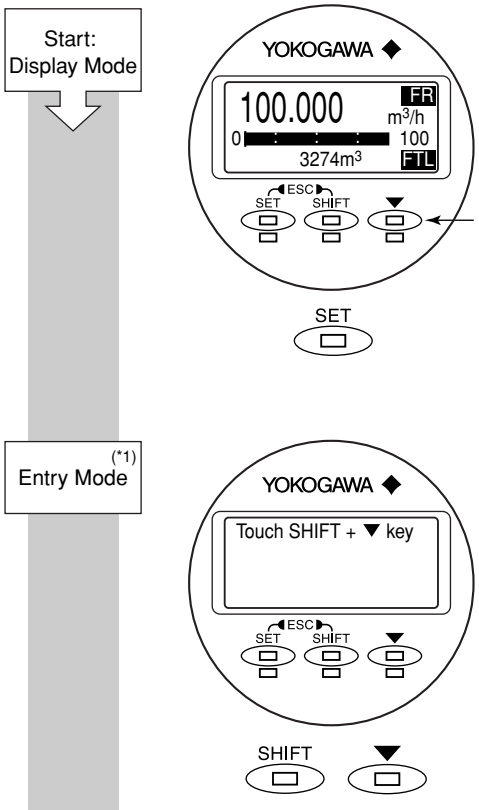
Before changing any settings, be sure to check the corresponding setting details in Chapter 6: Parameter Description.

5.2.1 Display Mode → Setting Mode

Display Mode will be adopted when the power is turned on, and the Setting Mode can be activated using the following procedure.



Sample Display: Procedure for moving from Display Mode to Setting Mode



1st line: Actual instantaneous flow rate [FR]

2nd line: Bar graph indicating instantaneous flow rate

3rd line: Totalized forward flow rate [FTL]

Hold the SET switch for 2 seconds.

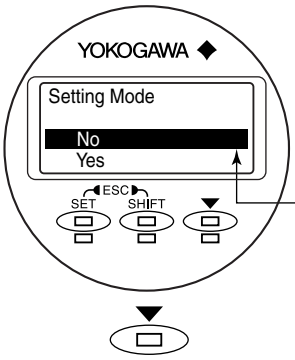
Touch SHIFT and ▼ switches simultaneously.

NOTE

When other operations are carried out, the system will automatically return to the Display Mode.
When no operations in this display are carried out for 20 seconds, the system will automatically return to the Display Mode.

NOTE (*1)

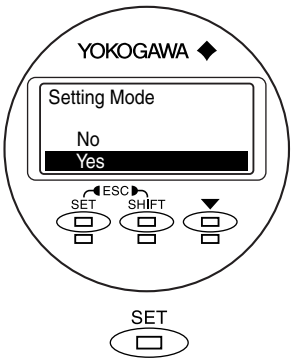
The Major Item Parameter which is set just before will be shown when entrying the Setting Mode again within 1 minute after returning from Setting Mode to Display Mode.



A screen is displayed to confirm whether or not the system is to enter Setting Mode.

Press the ▼ switch and select [Yes].

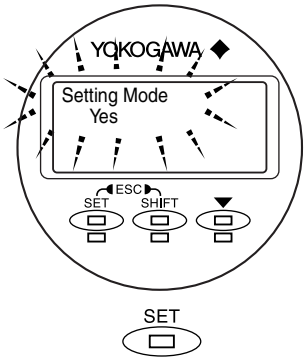
The reversed-character (i.e. the cursor position) indicates the item that is currently selected.



When [Yes] has been selected, touch the SET switch.

NOTE

When the operations except SET and ▼ switches are carried out, the system will automatically return to the Display Mode. When no operations in this display are carried out for 20 seconds, the system will automatically return to the Display Mode.



In order to request confirmation, the entire display flashes on and off.

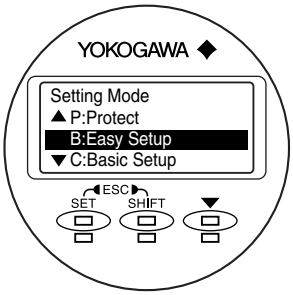
Touch the SET switch once again at this time to fix your selection.

NOTE

When no operations in the flashed display are carried out for 20 seconds, the system will automatically return to the Display Mode.

When the operations except SET are carried out, the system will automatically return to the Display Mode.

Setting Mode



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The system enters Setting Mode.

Parameters to be set can be selected.

To Parameter Search Mode

This completes the procedure for changing from the Display Mode to the Parameter Search Mode.

5.2.2 Setting Mode

When the Setting Mode has been activated using the procedure from Section 5.2.1, parameters can be selected for setting.

NOTE

If no operations are carried out for a period of 10 minutes in Setting Mode, the system will automatically return to the Display Mode.

Format for Parameter Data

Depending on the type of parameter, data is formatted in one of the following three ways.

Format	Typical display	Content
(i) Selection-type	B21:Base Flow Unit m^3 ▲m^3 ▼kl(Kiloliter)	The desired data item is selected from a predefined list.
(ii) Numeric-type	B23:Flow Span 100 l/min 000100 l/min Rng:0.00001 → 32000	Data is set using the values in each digit and using the decimal point.
(iii) Alphanumeric-type	C10:Tag No FI-1101 FI-1201	Data is composed using alphanumeric characters (in the case of tag numbers, special units, and the like). With this format, setting can be carried out using up to 16 of the characters shown below.

Regarding the alphanumeric-type format (iii), the following alphanumerics are displayed in the following sequence:

#%&*+-./0123456789:<>ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghij klmnopqrstuvwxyz[space]

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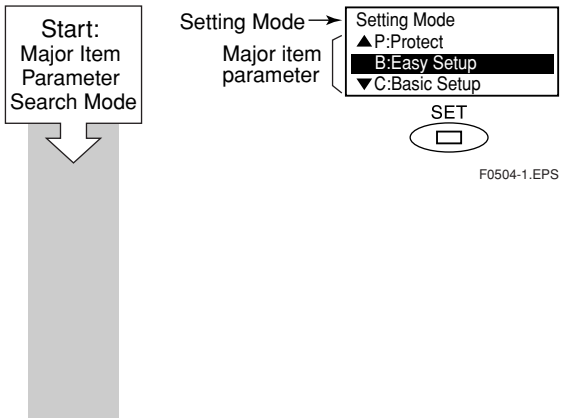
5.3 Parameter Setting Procedure

Once the system is in Setting Mode, the parameters for setting can be selected. Parameters that are frequently used have been grouped together in Easy Setup in Menu B. This section provides a description of the parameter setting procedure using **B: Easy Setup** and **C: Basic Setup**.

For more details regarding parameter content, please refer to Section 6: Parameter Description.

5.3.1 Setting Example for Selection-Type Data: Flow rate units

This example describes the setting of the flow rate units for the selection-type parameter **B21: Base Flow Unit** from m^3 to l (Liter).



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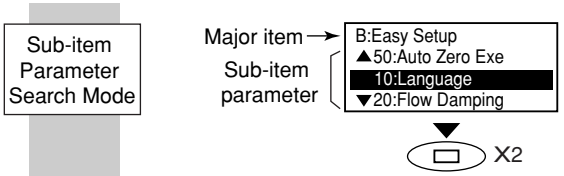
Major Item Parameter Search Mode has been accessed in this screen.

Touch the SET switch to access **B: Easy Setup**.

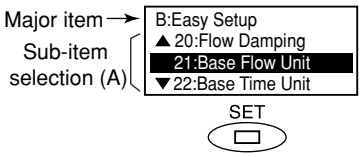
NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.

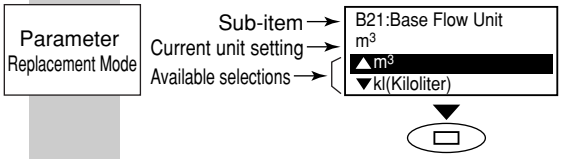


Sub-item Parameter Search Mode has been accessed in this screen.

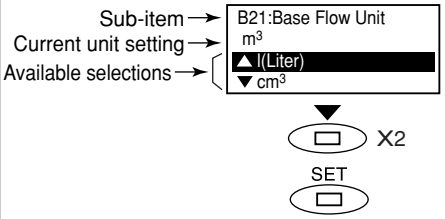
Touch the ▭ switch to move the cursor to **B21: Base Flow Unit**.



The cursor has been moved to **B21: Base Base Flow Unit** in this screen. (Sub-item selection screen (A))

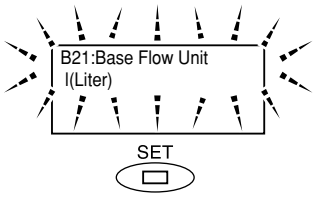


In this screen, Parameter Replacement Mode has been called up using the SET ▭ switch.



Touch the ▭ switch to move the cursor to the unit item for selection. In this example, the ▭ switch is touched twice to select l (Liter)

When l (Liter) has been selected, touch the SET ▭ switch.

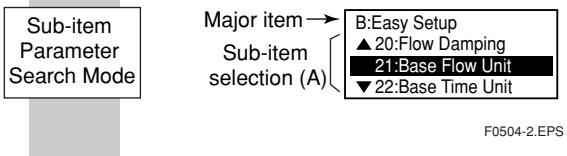


In order to request confirmation, the entire display flashes on and off. Touch the SET ▭ switch once again at this time to fix your selection.

NOTE

When no operations are carried out for 20 seconds in the flashing state, the system will automatically return to the Sub-item Parameter Search Mode.

When the operations except SET ▭ are carried out, the parameter cannot be set.



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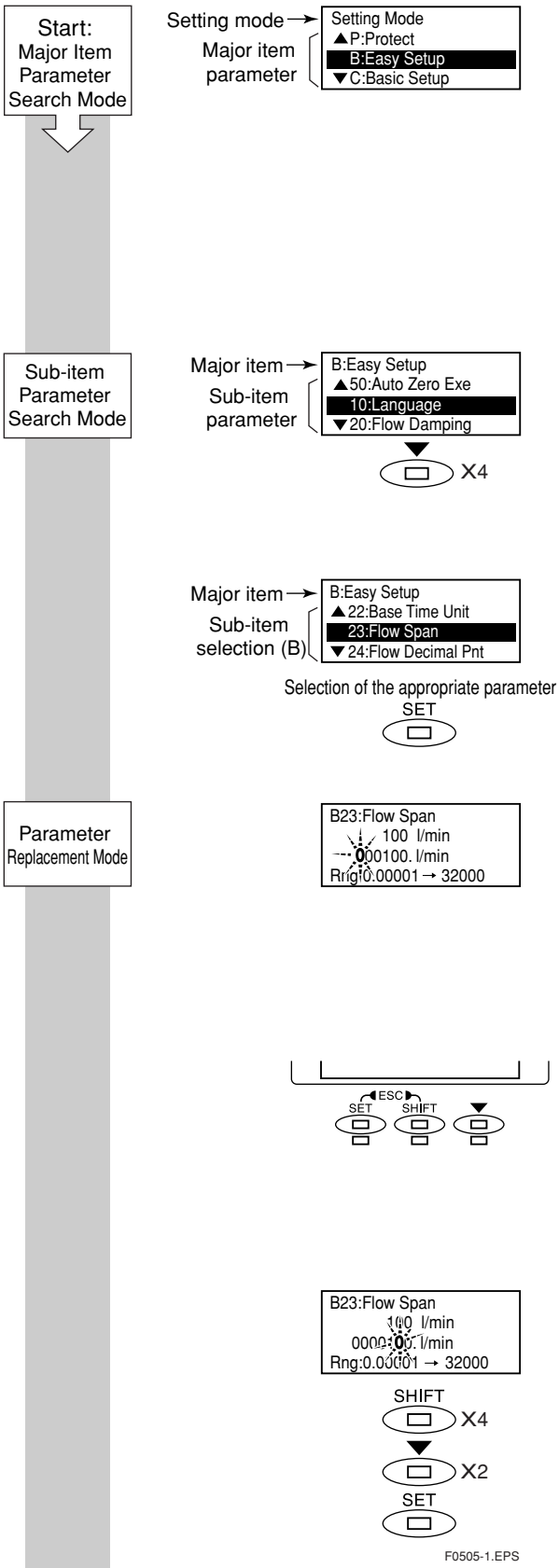
The system automatically returns to sub-item selection screen (A).

5.3.2 Setting Example for Numeric-Type Data: Flow rate span

This example describes the setting of the flow rate span for the numeric-type parameter **B23: Flow Span** from 100 l/min to 120 l/min.



Setting Mode Condition

Touch the SET switch to access **B: Easy Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the switch to cycle through these items.

Sub-Item Parameter Search Mode has been accessed in this screen.

Touch the switch to move the cursor to **B23: Flow Span**.

The cursor has been moved to **B23: Flow Span** in this screen. (Sub-item selection screen (B))

Touch the SET switch to access Parameter Replacement Mode.

Once Parameter Replacement Mode has been selected, the digit that can be replaced will be flashed on and off. When in this condition, confirm the relevant setting range as displayed at the bottom of the screen and then set the parameter as required.

In this example, the parameter will be set to “120 l/min”.

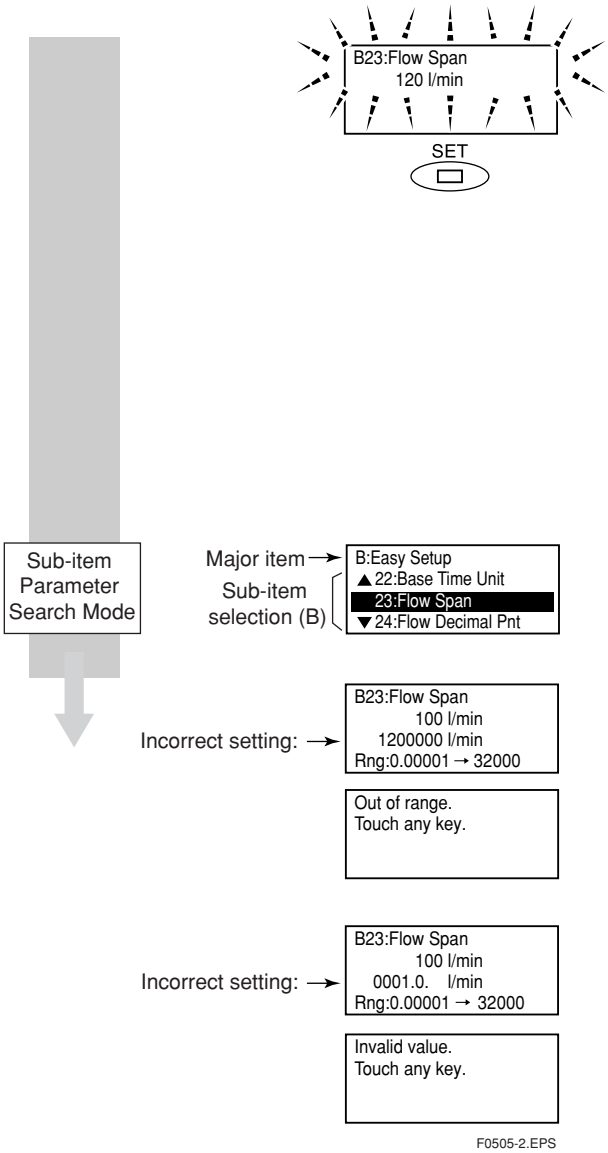
NOTE

When setting a new value, use the SHIFT switch to move from digit to digit, and use the switch to cycle through values for each individual digit. In addition to digit, it is also possible to select a decimal point, and this allows the position of the decimal point to be changed.

Modify the value to “120 l/min” as follows:

Touch the SHIFT switch to move the cursor to the position for multiples of 10. Then, touch the switch to change the value at this position from “0” to “2”.

When the value of “120” has been setup, touch the SET switch.



When the SET switch is touched, the entire display flashes on and off. Confirm that the setting has been correctly changed to "120", and then fix this value by touching the SET switch once again.

NOTE

When no operations are carried out for 20 seconds in the flashing state, the system will automatically return to the Sub-item Parameter Search Mode.

When the operations except SET are carried out, the parameter cannot be set.

The system automatically returns to sub-item selection screen (B).

NOTE

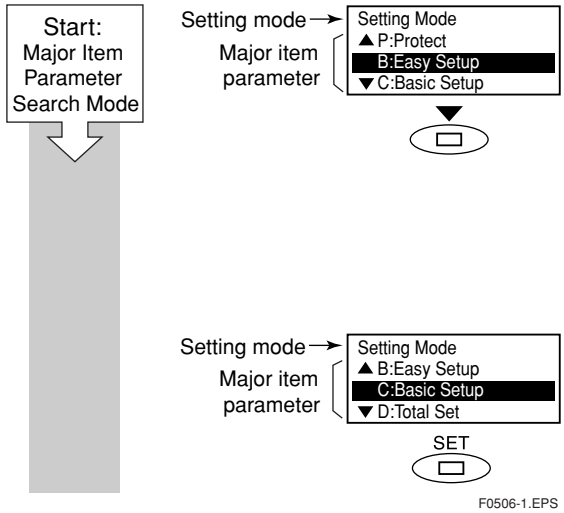
If the input value is outside the valid selection range, the message "Out of range. Touch any key." will be displayed. In such a case, touch any switch to return to Parameter Replacement Mode and redo the setting.

NOTE

If more than one decimal point has been input, the message "Invalid value. Touch any key." will be displayed. In such a case, touch any switch to return to Parameter Replacement Mode and redo the setting.

5.3.3 Setting Example for Alphanumeric-Type Data: Tag number

This example describes the setting of the tag number for the alphanumeric-type parameter **C10: Tag No**. from "FI-1101" to "FI-1201."



Setting Mode Condition

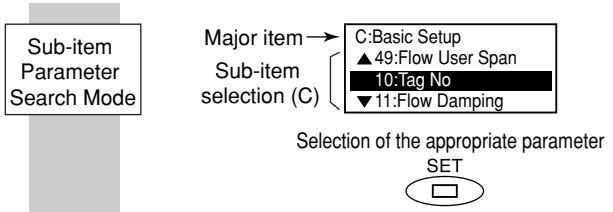
Touch the ▼ switch to access **C: Basic Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.

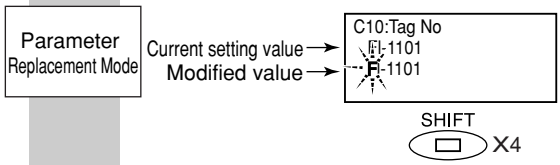
The cursor has been moved to **C: Basic Setup** in this screen.

Touch the SET switch to enter **C: Basic Setup**.

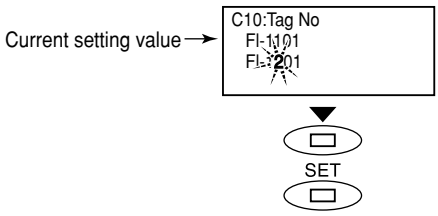


Upon selection of **C: Basic Setup**, the cursor will be positioned at **C10: Tag No**. (Sub-item selection screen (C))

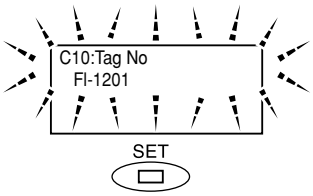
Touch the SET switch to access Parameter Replacement Mode.



The cursor will flash on and off on the left of the tag number. As "FI-1201" is to be setup in this example, touch the SHIFT switch to move the cursor to the position for multiples of 100.



At the position for multiples of 100, touch the ▼ switch to change the "1" to "2". When the setting has been changed to "FI-1201", touch the SET switch.

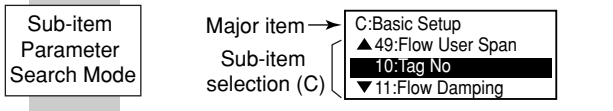


When the SET switch is touched, the entire display flashes on and off. Confirm that the setting has been correctly changed to "FI-1201", and then fix this setting by touching the SET switch once again.

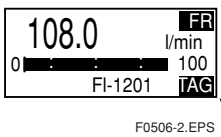
NOTE

When no operations are carried out for 20 seconds in the flashing state, the system will automatically return to the Sub-item Parameter Search Mode.

When the operations except SET are carried out, the parameter cannot be set.



The system automatically returns to sub-item selection screen (C).



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After returning to Display Mode by touching using the (SET and SHIFT) twice as escape switches, it will be possible to confirm the modified content (if Display Select has been setup to display the tag number.)

Indicates selection of Tag No display for B42: Display Select3.

6. PARAMETER DESCRIPTION

6.1 Parameters

With the exception of parameters that were specified by the customer upon ordering, all of the internal parameters will initially be set to default values. Actions such as the modification of display details can then be carried out whenever necessary.

For FOUNDATION Fieldbus protocol, please refer to IM 01E20F02-01E.

For PROFIBUS PA protocol, please refer to IM 01E20F12-01E.

IMPORTANT

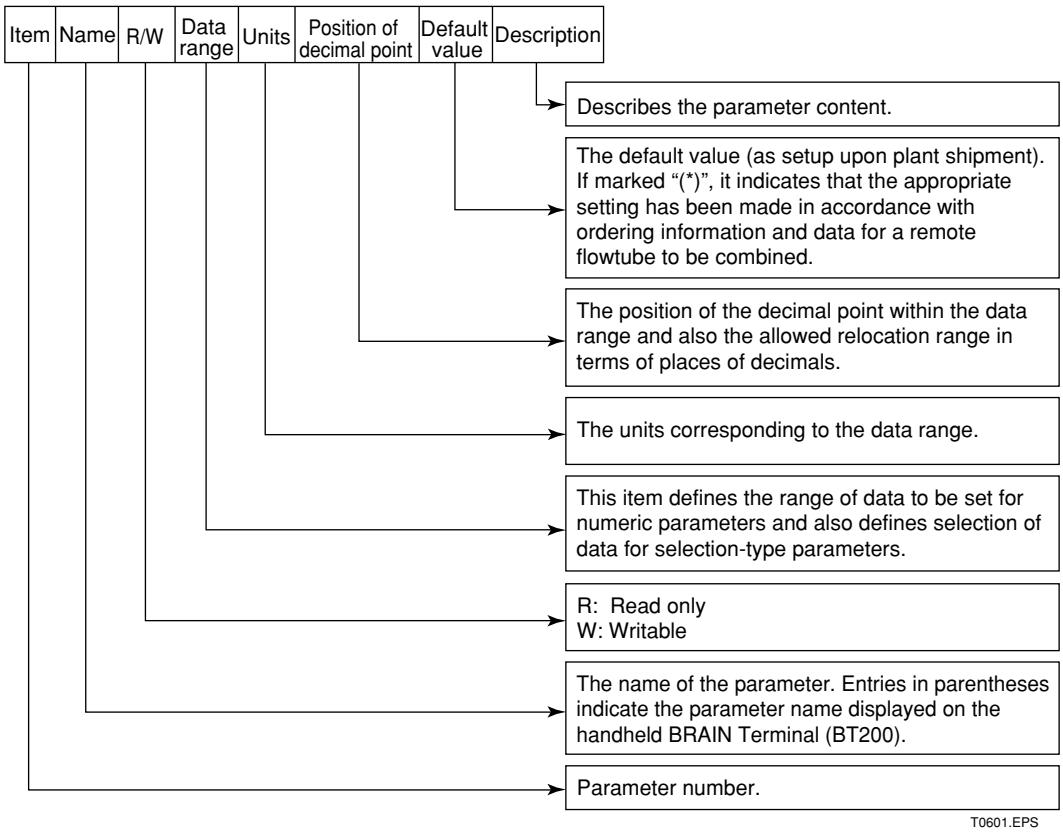
Make sure to keep the instrument's power on at least for 30 seconds after you set the parameters. If you turn the power off immediately after the parameters are set, the settings will be canceled.

NOTE

In order to ensure that correct flow rate data can be acquired, it is crucial that the nominal size, flow rate span, and meter factor of the combined remote flowtube are set. In cases where a remote flowtube is ordered at the same time as the AXFA14, or where the AXF integral flowmeter is ordered, the nominal size and meter factor will be set upon shipment from the manufacturing plant, and these will not require additional setting. If the AXFA14 is ordered separately, the default value will be set for the meter factor; accordingly, it will be necessary to change this setting to the meter factor indicated on your remote flowtube data plate.
If a flow rate span was specified upon ordering, this will be set before shipment. If this is not the case, however, it will be necessary for the appropriate value to be set by the user.

6.2 Parameter Lists

Parameter lists are comprised of the following items.


Item
Name
R/W
Data range
Units
Position of decimal point
Default value
Description
Describes the parameter content.
The default value (as setup upon plant shipment). If marked "(*)", it indicates that the appropriate setting has been made in accordance with ordering information and data for a remote flowtube to be combined.
The position of the decimal point within the data range and also the allowed relocation range in terms of places of decimals.
The units corresponding to the data range.
This item defines the range of data to be set for numeric parameters and also defines selection of data for selection-type parameters.
R: Read only
W: Writable
The name of the parameter. Entries in parentheses indicate the parameter name displayed on the handheld BRAIN Terminal (BT200).
Parameter number.
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6.3 Parameter List Overview

(1) Item A (Menu A): Display items

Menu A contains the instantaneous flow rate, totalization values, and other items relevant to display.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
A00	Display (DISPLAY)						
A10	FR (FLOW RATE (%))	R	-110.0 to 110.0	%	1		For Display Mode only
A20	FR (FLOW RATE)	R	-999999 to 999999	B21/B22 (C40/C41)	0 to 3		For Display Mode only
A21	FR (FLW RATE (mA))	R	2.400 to 21.600	mA	3		For Display Mode only
A30	FTL (TOTAL)	R	0 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A31	RTL (REV TOTAL)	R	0 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A32	DTL (DIF TOTAL)	R	-99999999 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

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(2) Item B (Menu B): Easy Setup items

Those parameters with a high frequency of use have been grouped together in Menu B. All basic functions can be controlled using only the parameters from this block.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
B00	Easy Setup (EASY SETUP)						
B10	Language (LANGUAGE)	W	English Japanese French German Italian Spanish			English	Selects the language used for the display unit. Linked with H30.
B20	Flow Damping (FLOW DAMPING)	W	0.1 to 200.0	s	1	3.0 s	Sets damping time. Linked with C11.
B21	Base Flow Unit (FLOW UNIT)	W	Ml(Megaliter) m^3 kl (Kiloliter) l (Liter) cm^3 m t kg g kcf cf mcf Mgal (US) kgal (US) gal (US) mgal (US) kbbl (US Oil) bbl (US Oil) mbbl (US Oil) ubbl (US Oil) kbbl (US Beer) bbl (US Beer) mbbl (US Beer) ubbl (US Beer) ft klb (US) lb (US)			m (*)	Selects flow units for the flow rate span. Linked with C40.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
B22	Base Time Unit (TIME UNIT)	W	/d /h /min /s			/s (*)	Selects time units for the flow rate span. Linked with C41.
B23	Flow Span (FLOW SPAN)	W	0.0001 to 32000	B21/B22 (C40 /C41)	0 to 4	1 m/s (*)	Sets flow rate span (with units from B21 and B22). Linked with C42.
B24	Flow Decimal Pnt (FLOW DECIMAL)	W	Auto 0 1 2 3			Auto (*)	Selects decimal point position for the display unit's instantaneous flow rate. Linked with C43.
B30	Total Unit (TOTAL UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for totalization display. Linked with D10.
B31	Total Scale (TOTAL SCALE)	W	0 to 32000	B30 (D10)	0 to 4	0 (*)	Sets the flow rate per one pulse as used for the totalization display. Linked with D11.
B32	Pulse Unit (PULSE UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/ Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for pulse output. Linked with E10.
B33	Pulse Scale (PULSE SCALE)	W	0 to 32000	B32 (E10)	0 to 4	0 (*)	Sets the flow rate per one pulse as used for pulse output. Linked with E11.
B40	Display Select1 (DISP SELECT1)	W	Flow Rate(%) Flow Rate Flow Rate(mA) Forward Total Reverse Total Dif Total			Flow Rate	Selects content of the first line for Display Mode. Linked with H10.
B41	Display Select2 (DISP SELECT2)	W	Off Flow Rate(%) Flow Rate Flow Rate(mA) Flow Rate(Bar) Forward Total Reverse Total Dif Total Tag No Adhesion Check Communication			Off	Selects content of the second line for Display Mode. Linked with H11.
B42	Display Select3 (DISP SELECT3)	W	Same as B41 (Display Select2)			Off	Selects content of the third line for Display Mode. Linked with H12.
B50	Auto Zero Exe (AUTOZERO EXE)	W	No Execution Execution			No Execution	Selects whether or not automatic zero adjustment is carried out. Linked with M10.
B60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

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(3) Item C (Menu C): Basic Setting items

Menu C principally contains the basic setting items for the flowtube.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
C00	Basic Setup (BASIC SETUP)						
C10	Tag No (TAG NO)	W	ASCII 16 characters				Sets Tag number up to 16 characters.
C11	Flow Damping (FLOW DAMPING)	W	0.1 to 200.0	s	1	3.0 s	Sets damping time. Linked with B20.
C20	Measure Mode (MEASURE MODE)	W	Standard DF Enhanced DF			Standard DF	Selects measurement mode for dual frequency excitation
C21	Low MF (LOW MF)	W	0.0100 to 3.0000		4	1.0000 (*)	Sets low-frequency meter factor for standard dual frequency excitation
C22	High MF (HIGH MF)	W	0.0100 to 3.0000		4	1.0000 (*)	Sets high-frequency meter factor for standard dual frequency excitation
C23	Low MF(EDF) (LOW MF(EDF))	W	0.0000 to 3.0000		4	1.0000 (*)	Sets low-frequency meter factor for enhanced dual frequency excitation
C24	High MF(EDF) (HIGH MF(EDF))	W	0.0000 to 3.0000		4	1.0000 (*)	Sets high-frequency meter factor for enhanced dual frequency excitation
C31	Nominal Size Unit (SIZE UNIT)	W	mm inch			mm inch	Selects the nominal size units for the flowtube.
C32	Nominal Size (NOMINAL SIZE)	W	0.99 to 3000.1 0.01 to 120.1	mm inch	0 to 2	100 (*)	Sets flowtube nominal size in selected unit at C31.
C40	Base Flow Unit (FLOW UNIT)	W	Ml(Megaliter) m^3 kl(Kiloliter) l(Liter) cm^3 m t kg g kcf cf mcf Mgal (US) kgal (US) gal (US) mgal (US) kbbl (US Oil) bbl (US Oil) mbbl (US Oil) ubbl (US Oil) kbbl (US Beer) bbl (US Beer) mbbl (US Beer) ubbl (US Beer) ft klb (US) lb (US)			m (*)	Selects flow units for the flow rate span. Linked with B21.
C41	Base Time Unit (TIME UNIT)	W	/d /h /min /s			/s (*)	Selects time units for the flow rate span. Linked with B22.
C42	Flow Span (FLOW SPAN)	W	0.0001 to 32000	C40/C41 (B21 /B22)	0 to 4	1 m/s (*)	Sets flow rate span (with units from C40 and C41). Linked with B23.
C43	Flow Decimal Pnt (FLOW DECIMAL)	W	Auto 0 1 2 3			Auto (*)	Selects decimal point position for the display unit's instantaneous flow rate. Linked with B24.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
C44	Velocity Check (VELOCITY CHK)	R	0.000 to 99.999	m/s	3		Display of the span setting using flow velocity (m/s).
C45	Density Unit (DENSITY UNIT)	W	kg/m^3 lb/gal lb/cf			kg/m^3	Sets units for density when mass flow rate is selected.
C46	Mass Flow Density (MASS DENSITY)	W	0 to 32000	C45	0 to 4	0	Sets density when mass flow rate is selected (with units from C45).
C47	User Span Select (USER SPN SEL)	W	No Yes			No	Selects whether or not special units are used for flow rate units.
C48	Flow User Unit (FL USER UNIT)	W	8 alphanumeric characters				Sets the special flow rate units.
C49	Flow User Span (FL USER SPAN)	W	0.0001 to 32000	C48	0 to 4	100	Sets span when using special flow rate units.
C60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

T0604-2.EPS

(4) Item D (Menu D): Total Setting items

Menu D contains setting items such as the totalization scale and the forward/reverse totalized values.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
D00	Total Set (TOTAL SET)						
D10	Total Unit (TOTAL UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for totalization display. Linked with B30.
D11	Total Scale (TOTAL SCALE)	W	0 to 32000	D10 (B30)	0 to 4	0 (*)	Sets the flow rate per one pulse as used for totalization display. Linked with B31.
D12	Total Decimal Pnt (TL DECIMAL)	W	0 1 2 3 4 5 6 7			0	Selects position of decimal point for totalization display
D13	Total Low Cut (TOTAL LOWCUT)	W	0 to 100	%	0	3 %	Sets the range in vicinity of 0% within which the totalization display will be halted.
D20	Total Execution (TOTAL EXEC)	W	Start Stop Preset Total Preset Rev Total			Start	Executes “Start” or “Stop” of the totalization function, or executes “Preset Total” or “Preset Rev Total”.
D21	Ttl Set Val Lower (TL SET VAL L)	W	0 to 999999		0	0	Sets the totalization preset value in the lower 6 digits of the 8-digit totalized value.
D22	Ttl Set Val Upper (TL SET VAL U)	W	0 to 99		0	0	Sets the totalization preset value in the upper 2 digits of the 8-digit totalized value.
D23	Ttl Switch Lower (TL SWITCH LO)	W	0 to 999999		0	0	Sets the totalization switch value in the lower 6 digits of the 8-digit totalized value.
D24	Ttl Switch Upper (TL SWITCH UP)	W	0 to 99		0	0	Sets the totalization switch value in the upper 2 digits of the 8-digits totalized value.
D30	Ttl User Select (TL USER SEL)	W	No Yes			No	Selects whether or not special units are used as totalized units.
D31	Ttl User Unit (TL USER UNIT)	W	8 alphanumeric characters				Sets the special totalized units.
D60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

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(5) Item E (Menu E): Pulse Setting items

Menu E contains items relevant to pulse output. This is used to set parameters such as the pulse scale and width.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
E00	Pulse Set (PULSE SET)						
E10	Pulse Unit (PULSE UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for pulse output. Linked with B32.
E11	Pulse Scale (PULSE SCALE)	W	0 to 32000	E10 (B32)	0 to 4	0 (*)	Sets the flow rate per one pulse as used for pulse output. Linked with B33.
E12	Pulse Width (PULSE WIDTH)	W	50% Duty 0.05 ms 0.1ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms			50% Duty	Selects the pulse width for pulse output.
E13	Pulse Low Cut (PULSE LOWCUT)	W	0 to 100	%	0	3 %	Sets the range in vicinity of 0% within which pulse output will be halted.
E60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Function”.

T0606.EPS

(6) Item F (Menu F): Status Functions Setting items

Menu F contains items relevant to multiplex range output and other status Input/Output.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
F00	Status Function (STATUS FUNC)						
F20	DO Function (DO FUNCTION)	W	No Function Pulse Output Alarm Output Warning Output Total Switch (O) H/L Alarm (O) HH/LL Alarm (O) Fwd/Rev Rngs (O) Auto 2 Rngs (O) Auto 3 Rngs (O) Auto 4 Rngs (O) Ext 2 Answer (O)			Pulse Output	Selects function for the DO terminal
F21	DIO Function (DIO FUNCTION)	W	No Function Alarm Output Warning Output Total Switch (O) H/L Alarm (O) HH/LL Alarm (O) Fwd/Rev Rngs (O) Auto 2 Rngs (O) Auto 3 Rngs (O) Auto 4 Rngs (O) Ext 2 Answer (O) 0% Singal Lock (I) Ext Auto Zero (I) Ext Ttl Set (I) Ext R Ttl Set (I) Ext 2 Ttl Set (I)			No Function	Selects function for the DIO terminal

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
F22	DO Active Mode (DO ACT MODE)	W	Closed(On) Act Open(Off) Act			Closed(On) Act	Selects whether DO terminal will be set to “On Active” or “Off Active”.
F23	DIO Active Mode (DIO ACT MODE)	W	Closed/Short Act Open/Open Act			Closed/Short Act	Selects whether DIO terminal will be set to “Closed/Short Active” or“Open/Open Active”.
F30	Forward Span2 (FWD SPAN2)	W	0.0001 to 32000	C40 /C41	0 to 4	1	Sets flow rate span for forward No. 2 range
F31	Forward Span3 (FWD SPAN3)	W	0.0001 to 32000	C40 /C41	0 to 4	1	Sets flow rate span for forward No. 3 range
F32	Forward Span4 (FWD SPAN4)	W	0.0001 to 32000	C40 /C41	0 to 4	1	Sets flow rate span for forward No. 4 range
F33	Reverse Span1 (REV SPAN1)	W	0.0001 to 32000	C40 /C41	0 to 4	1	Sets flow rate span for reverse No. 1 range
F34	Reverse Span2 (REV SPAN2)	W	0.0001 to 32000	C40 /C41	0 to 4	1	Sets flow rate span for reverse No. 2 range
F40	Auto Range Hys (AUTO RNG HYS)	W	0 to 15	%	0	10 %	Sets hysteresis width for automatic range switching
F41	Bi Direction Hys (BI DIREC HYS)	W	0 to 8	%	0	2 %	Sets hysteresis width for forward/reverse switching
F60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Function”.

T0607-2.EPS

(7) Item G (Menu G): Alarm Setting items

Menu G contains setting items relevant to alarm output, burnout, alarm record, etc.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
G00	Alarm (ALARM)						
G10	Low Alarm (LOW ALARM)	W	-110 to 110	%	0	-110	Sets level setting value for low flow rate limit (L)
G11	High Alarm (HIGH ALARM)	W	-110 to 110	%	0	110	Sets level setting value for high flow rate limit (H)
G12	Low Low Alarm (LO LO ALARM)	W	-110 to 110	%	0	-110	Sets level setting value for low-low flow rate limit (LL)
G13	High High Alarm (HI HI ALARM)	W	-110 to 110	%	0	110	Sets level setting value for high-high flow rate limit (HH)
G14	H/L Alarm Hys (H/L ALM HYS)	W	0 to 10	%	0	5 %	Sets hysteresis width for high-low flow rate limit alarm
G21	4-20mA Alarm Out (4-20 ALM OUT)	W	2.4mA or Less 4.0mA Hold 21.6mA or More			21.6mA or More	Selects the current output during alarm occurrence.
G22	4-20mA Burn Out (4-20 BURNOUT)	R	High Low			—	Displays the current output during a CPU failure.
G30	Alm-Setting (ALM-SETTING)	W	No Yes			Yes	Selects whether a setting alarm is to be specified as an alarm.
G31	Alm-Sig Over (ALM-SIG OVER)	W	No Yes			Yes	Selects whether a signal overflow alarm is to be specified as an alarm.
G32	Alm-Emp Pipe (ALM-EMP PIPE)	W	No Yes			Yes	Selects whether an empty pipe alarm is to be specified as an alarm.
G33	Alm-HH/LL (ALM-HH/LL)	W	No Yes			No	Selects whether a flow rate high-high or low-low alarm is to be specified as an alarm.
G34	Alm-Adhesion (ALM-ADHESION)	W	No Yes			No	Selects whether an electrode adhesion alarm is to be specified as an alarm.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
G40	Operation Time (OPERATE TIME)	R	0D 00:00 to 99999D 23:59				Operation time
G41	Alm Record1 (ALM RECORD1)	R	10:uP Fault 11:EEPROM Fault 12:A/D(H) Fault 13:A/D(L) Fault 14:A/D(Z) Fault 15:Coil Open 16:EEPROM Dflt 18:Power Off 19:Inst Pwr Fail 28:WDT 30:Sig Overflow 31:Empty Pipe 33:Adhesion Alm				Displays the content of the most recent alarm.
G42	Alm Record Time1 (ALM TIME 1)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the most recent alarm.
G43	Alm Record2 (ALM RECORD2)	R	Same as G41 (Alm Record Time1)				Displays the content of the second most recent alarm.
G44	Alm Record Time2 (ALM TIME 2)	R	0D 00:00 to 99999D 23:59				Displays the operation time at occurrence of the second most recent alarm.
G45	Alm Record3 (ALM RECORD3)	R	Same as G41 (Alm Record Time1)				Displays the content of the third most recent alarm.
G46	Alm Record Time3 (ALM TIME 3)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the third most recent alarm.
G47	Alm Record4 (ALM RECORD4)	R	Same as G41 (Alm Record Time1)				Displays the content of the fourth most recent alarm.
G48	Alm Record Time4 (ALM TIME 4)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the fourth most recent alarm.
G60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

T0608-2.EPS

(8) Item H (Menu H): Display Setting items

Menu H contains setting items that are relevant to display on the display unit.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
H00	Display Set (DISP SET)						
H10	Display Select1 (DISP SELECT1)	W	Flow Rate(%) Flow Rate Flow Rate(mA) Forward Total Reverse Total Dif Total			Flow Rate(%)	Selects content of the first line for Display Mode. Linked with B40.
H11	Display Select2 (DISP SELECT2)	W	Off Flow Rate(%) Flow Rate Flow Rate(mA) Flow Rate(Bar) Forward Total Reverse Total Dif Total Tag No Adhesion Check Communication			Off	Selects content of the second line for Display Mode. Linked with B41.
H12	Display Select3 (DISP SELECT3)	W	Same as H11 (Display Select2)			Off	Selects content of the third line for Display Mode. Linked with B42.
H20	Display Cycle (DISP CYCLE)	W	200ms 400ms 1s 2s 4s 8s			400ms	Selects the display cycle.
H30	Language (LANGUAGE)	W	English Japanese French German Italian Spanish			English	Selects the language used by the display unit. Linked with B10.
H60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

T0609.EPS

(9) Item J (Menu J): Auxiliary Function Setting items

Menu J contains setting items such as the flow direction, rate limits, and low cut.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
J00	Aux (AUX)						
J10	4-20mA Low Cut (4-20 LOW CUT)	W	0 to 10	%	0	0%	Sets the range in vicinity of 0% within which the current output will be 4 mA.
J11	4-20mA Low Lmt (4-20 LOW LMT)	W	-20.0 to 100.0	%	1	-20.0%	Sets the low limit for current output
J12	4-20mA High Lmt (4-20 HI LMT)	W	0.0 to 120.0	%	1	120.0%	Sets the high limit for current output
J20	Flow Direction (FLOW DIRECT)	W	Forward Reverse			Forward	Selects the flow direction.
J21	Rate Limit (RATE LIMIT)	W	0 to10	%	0	5%	Sets the level to reduce output fluctuation.
J22	Dead Time (DEAD TIME)	W	0 to 15	s	0	0s	Sets the dead time to reduce output fluctuation. When “0” is set, rate limit function is not available.
J23	Pulsing Flow (PULSING FLOW)	W	No Yes			No	Selects whether pulsing flow is to be supported.
J24	T/P Damp Select (T/P DAMP SEL)	W	Damping No Damping			Damping	Selects whether the flow rate value obtained through damping calculation for total/pulse or the instantaneous flow rate value (no damping) for total/pulse is to be used.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
J30	Power Synch (POWER SYNCH)	W	No Yes			Yes	Selects whether or not the internal frequency is to be synchronized with the power supply frequency.
J31	Power Frequency (POWER FREQ)	R/W	47.00 to 63.00	Hz	2	50.00	Displays the power-supply frequency (for Power Synch = "Yes"), or sets the power-supply frequency (for Power Synch="No").
J40	Memo 1 (MEMO 1)	W	ASCII 16 characters				Memo field
J41	Memo 2 (MEMO 2)	W	ASCII 16 characters				Memo field
J42	Memo 3 (MEMO 3)	W	ASCII 16 characters				Memo field
J50	Software Rev No (SOFTWARE REV)	R	—				Software revision number
J60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

T0610-2.EPS

(10) Item K (Menu K): Diagnostic Function Setting items

Menu K contains items that are relevant to the diagnosis of insulation adhesion to the electrode.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
K00	Diagnosis (DIAGNOSIS)						
K10	Adhesion Check (ADHESION CHK)	W	No Yes			No	Selects whether or not to perform diagnosis of adhesion to the electrode.
K11	Adhesion Level1 (ADH LEVEL1)	W	0.00 to 100.00	M ohm	2	0.10	Sets the resistance value for adhesion Level 1 to the electorode.
K12	Adhesion Level2 (ADH LEVEL2)	W	0.00 to 100.00	M ohm	2	0.50	Sets the resistance value for adhesion Level 2 to the electorode.
K13	Adhesion Level3 (ADH LEVEL3)	W	0.00 to 100.00	M ohm	2	1.00	Sets the resistance value for adhesion Level 3 to the electorode.
K14	Adhesion Level4 (ADH LEVEL4)	W	0.00 to 100.00	M ohm	2	3.00	Sets the resistance value for adhesion Level 4 to the electorode.
K15	Adh Measure Value (ADH MEAS VAL)	R	—	M ohm	2		Displays the resistance value for adhesion to the electrode.
K60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

T0611.EPS

(11) Item M (Menu M): Automatic Zero-Adjustment Function Setting items

Menu M contains items that are relevant to automatic zero adjustment.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
M00	Adjustment (ADJUSTMENT)						
M10	Auto Zero Exe (AUTOZERO EXE)	W	No Execution Execution			No Execution	Selects whether or not automatic zero adjustment is carried out. Linked with B50.
M11	Magflow Zero (MAGFLOW	R/W	-99.999 to 99.999		3	0.000	Displays the result of the automatic zero adjustment, or sets the zero point.
M60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

T0612.EPS

(12) Item N (Menu N): Loop Test Setting items

Menu N contains items that are relevant to the execution of loop testing.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
N00	Test (TEST)						
N10	Test Mode (TEST MODE)	W	Normal Test			Normal	Selects whether mode will be set to “Normal” or “Test”.
N11	Test Output Value (TEST OUT VAL)	W	-10 to 110	%	0	0%	Sets the test output value.
N30	Test DO (TEST DO)	W	Open(Off) Closed(On) Pulse			Open(Off)	Selects the test condition for DO terminal.
N31	Test DIO (O) (TEST DIO (O))	W	Input Mode Open(Off) Closed(On)			Input Mode	Selects the test condition for DIO terminal used for output.
N32	Test DIO (I) (TEST DIO (I))	R	Open Short				Displays the test condition for DIO terminal used for input.
N60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

T0613.EPS

(13) Item P (Menu P): Parameter Protection items

Menu P contains items that are relevant to write protection and passwords.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
P00	Protect (PROTECT)						
P10	Key Code (KEY CODE)	W	0 to 9999			0	Parameter of the display restriction
P20	Write Protect (W PROTECT)	R	No Yes			No	Displays whether or not overwriting of parameter data is prohibited.
P21	Enable Wrt Passwd (ENABLE WRITE)	W	ASCII 8 characters				Sets the correct password so that write protection function will be released.
P22	New Password (NEW PASSWORD)	W	ASCII 8 characters				Sets the password for write protection funcion
P23	Software Seal (SOFT SEAL)	R	Break Keep			Keep	Displays whether or not a Joker password was used (Break).
P60	— (SELF CHECK)	R	Good Error				See “6.5 Alarm Functions”.

T0613-1.EPS

6.4 Parameter Description

(1) Menu B: Easy Setup items

Those parameters with a high frequency of use have been grouped together in Easy Setup. All basic functions can be controlled using only the parameters from this block. Parameters from Menu B share identical names with those from other menus; however, modification of one such parameter will result in the other being automatically modified.

[B10: Language] Selection of language used for the display unit
→ This setting is linked with that of parameter **H30**.
One of the following languages can be selected for the display unit.

Data Range

Setting item	Description
English	All parameters, alarm messages, etc. displayed in English.
Japanese	All parameters, alarm messages, etc. displayed in Japanese katakana.
French	All parameters, alarm messages, etc. displayed in French.
German	All parameters, alarm messages, etc. displayed in German.
Italian	All parameters, alarm messages, etc. displayed in Italian.
Spanish	All parameters, alarm messages, etc. displayed in Spanish.

T0614.EPS

[B20: Flow Damping] Setting of the damping time constant
→ This setting is linked with that of parameter **C11**.
The damping time constant should be modified to suppress an output fluctuation or to change the response time. This time constant has an effect on analog output and on the flow rate display (i.e., actual instantaneous flow rate, %, current value), and in addition, it also affects pulse output and totalization. However, when "No Damping" has been set for **J24: T/P Damp Select**, there will be no effect on pulse output or totalization.

* Time constant: The time required for the output to reach 63.2% from 0%.

[B21: Base Flow Unit] Selection of flow units for the flow rate span
→ This setting is linked with that of parameter **C40**.
This parameter selects the flow units for the flow rate span. (In case of mass flow, the setting of density is also required. Refer to **C46: Mass Flow Density** for more details.)

[B22: Base Time Unit] Selection of time units for the flow rate span
→ This setting is linked with that of parameter **C41**.
This parameter selects the time units for the flow rate span; however, if "m" has been selected for the flow rate units, "/s" is automatically set for this parameter.

[B23: Flow Span] Setting of the flow rate span
→ This setting is linked with that of parameter **C42**.
The span can be set for the forward flow rate in the range 0 to 32,000 (although this does not include 0). The units set using **B21/C40: Base Flow Unit** and **B22/C41: Base Time Unit** will be displayed at this time.

NOTE

If the flow rate units, time units, and flow rate span are specified upon ordering, these parameters will be setup before shipment; however, if this is not the case, it will be necessary for the appropriate values to be set up by the user.

NOTE

Flow rate span is the value for instantaneous flow rate that corresponds to a current output of 20 mA. The following factors should be taken into consideration when deciding on the flow rate span.

- In the case of applications with large variations in flow rate, the maximum flow rate should be set. If a flow rate in excess of the flow rate span was to occur, output would be possible up to an upper limit of 108%, and beyond this, error would occur. Note that the same applies to pulse output and totalization.
- In the case of applications that have a relatively stable flow rate, a flow rate span of 1.5 to 2.0 times larger than the normal flow rate may be considered suitable.
- The flow rate to be adopted should - upon conversion to flow velocity - correspond to a value within the range of 0.1 to 10 m/s. The flow velocity can be confirmed using sizing data or with parameter **C44: Velocity Check**, and in the latter case, the value obtained when span is converted to flow velocity will be displayed.
- Regardless of the position of the decimal point, the largest value that can be set on the display unit is 32,000. Furthermore, it is not possible to set a number of 4 or greater for the highest-order digit. Similarly, if 3 is set for this highest-order digit, it will not be possible to set a

number of 2 or greater for the next digit to the right, regardless of the position of the decimal point.

Example: A value of 333.33 is represented by the character string 33333, and since this exceeds 32000, it cannot be set. In such a case, the value 333.3 should be set instead.

[B24: Flow Decimal Pnt] Setting of the decimal point position for the instantaneous flow rate
→ This setting is linked with that of parameter **C43**.
This parameter sets the position of the decimal point for instantaneous flow rate values in terms of the number of digits. When set using "Auto", the decimal point position will be automatically determined in accordance with the setting value for **B23/C42: Flow Span** as shown below.

Flow Span ≤ 9	Decimal point position: 3 digits
9 < Flow Span ≤ 90	Decimal point position: 2 digits
90 < Flow Span ≤ 900	Decimal point position: 1 digit
900 < Flow Span	Decimal point position: no digits (i.e., no decimal point)

When an item other than "Auto" is set, the selected number of digits for the decimal point position is used.

With the decimal point removed, 6 digits are available for the instantaneous flow rate value, and display is possible up to 999,999. If an overflow occurs as a result of the setting adopted for decimal point position, the warning **84: Disp Over Wng** will be displayed to provide notification of this condition.

Example: When 1000 m³/h is set for B23/C42: Flow Span

Item	Display content for instantaneous flow rate value
Auto	1000 m³/h
0	1000 m³/h
1	1000.0 m³/h
2	1000.00 m³/h
3	With the decimal point removed, 7 digits are not available for the instantaneous flow rate value; therefore, a warning is displayed.

T0615.EPS

[B30: Total Unit] Setting of units for totalization scale
→ This setting is linked with that of parameter **D10**.
This parameter selects the flow rate units for use in totalization.

Item	Description
n Unit/P	$10^{-9}\times$FU
u Unit/P	$10^{-6}\times$FU
m Unit/P	$10^{-3}\times$FU
Unit/P	FU
k Unit/P	$10^{3}\times$FU
M Unit/P	$10^{6}\times$FU
Pulse/s	Number of pulses to be counted for one second at 100% output.

FU: Flow rate unit selected in B21/C40: Base Flow Unit.

T0616.EPS

[B31: Total Scale] Setting of the totalization scale
→ This setting is linked with that of parameter **D11**.
The flow rate is totalized in individual counts in accordance with this parameter's setting. If 0 is selected, it indicates that the totalization function is not to be used.

NOTE

If a totalization scale is specified upon ordering, this parameter is set up before shipment; however, if this is not the case, it will be necessary for the appropriate value to be set up by the user.

NOTE

- By setting the totalization scale, the totalized value is displayed on the display unit. The totalization scale is determined in accordance with the settings of **B30/D10: Total Unit** and **B31/D11: Total Scale**.
- The maximum value that can be displayed is 99999999, and if this is exceeded, the value 0 is counted once again. However, counting stops at 99999999 when the totalization switch function is used.
- If multiple ranges are being used, the flow rate span for the smallest range becomes the standard for the **D13: Total Low Cut** setting value.
- Totalization for the reverse flow rate and for the differential flow rate is carried out only when "Fwd/Rev Ranges" is selected for **F20: DO Function** or **F21: DIO Function**.
- The totalized units are indicated on the display unit when **B31/D11** is 0.001, 0.01, 0.1, 1, 10, 100, or 1000. In the case of other setting values, the totalized units are not indicated.

Example 1: To count in 1 Ml (mega-liter) steps with flow rate span = 100 m^3/h
Since 1 Ml = 10^3 x m^3, k Unit/P is set for **B30/D10**, and 1 is set for **B31/D11**. "x10^3 m^3" is indicated for the totalized units in the Display Mode.

Example 2: To count in 10 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B30/D10**, and 10 is set for **B31/D11**. "x10^{-2} m^3" is indicated for the totalized units in the Display Mode.

Example 3: To count in 5 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B30/D10**, and 5 is set for **B31/D11**. Since **B31/D11** is not 0.001, 0.01, 0.1, 1, 10, 100, or 1000, there is no indication of totalized units in the Display Mode.

- Setting of totalization scale is not possible when specific selections have been made for **B30/D10: Total Unit**, **B31/D11: Total Scale**, and **B23/C42: Flow Span**. In such a case, a setting alarm will be displayed, and parameters should be changed in accordance with the instructions given.

[B32: Pulse Unit] Setting of the pulse units
→ This setting is linked with that of parameter **E10**.
This parameter selects the flow rate units to be used for pulse output.

Item	Description
n Unit/P	$10^{-9}\times$FU
u Unit/P	$10^{-6}\times$FU
m Unit/P	$10^{-3}\times$FU
Unit/P	FU
k Unit/P	$10^{3}\times$FU
M Unit/P	$10^{6}\times$FU
Pulse/s	Number of pulses to be output for one second at 100% output.

FU: Flow rate unit selected in B21/C40: Base Flow Unit.

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[B33: Pulse Scale] Setting of pulse scale
→ This setting is linked with that of parameter **E11**.
Pulse output is performed in individual counts in accordance with this parameter's setting. If 0 is selected, it indicates that the pulse output function is not to be used.

NOTE

If a pulse scale is specified upon ordering, this parameter is setup before shipment; however, if this is not the case, it will be necessary for the appropriate value to be setup by the user.

NOTE

- By setting the pulse scale, pulse output performs. The pulse scale is determined in accordance with the settings of **B32/E10: Pulse Unit** and **B33/E11: Pulse Scale**.
- If multiple ranges are being used, the flow rate span for the smallest range becomes the standard for the **E13: Pulse Low Cut** setting value.
- Pulse output for the reverse flow rate is carried out only when "Fwd/Rev Ranges" is selected for **F20: DO Function** or **F21: DIO Function**.
- Setting of pulse scale is not possible when specific selections have been made for **B32/E10: Pulse Unit**, **B33/E11: Pulse Scale**, **E12: Pulse Width** and **B23/C42: Flow Span**. In such a case, a setting alarm will be displayed, and parameters should be changed in accordance with the instructions given.

Example 1: To perform pulse output in 1 Ml (mega-liter) steps with flow rate span = 100 m^3/h
Since 1 Ml = 10^3 x m^3, k Unit/P is set for **B32/E10**, and 1 is set for **B33/E11**.

Example 2: To perform pulse output in 10 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B32/E10**, and 10 is set for **B33/E11**.

Example 3: To perform pulse output in 5 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B32/E10**, and 5 is set for **B33/E11**.

[B40: Display Select1] Setting of the first line for display unit
→ This setting is linked with that of parameter **H10**.
This parameter selects the display content of the first line for display unit. The size of the characters which are displayed will depend on the selections made for

B41/H11: Display Select2 and **B42/H12: Display Select3** as described below. (For more details, refer to Chapter 5: Basic Operating Procedures.)

CAUTION

It is not possible to set Display Select1 to "Off".

[B41: Display Select2] Setting of the second line for display unit
→ This setting is linked with that of parameter **H11**. This parameter selects the display content of the second line for display unit. When "Off" is selected, one-line display will be adopted regardless of the setting made for **B42/H12: Display Select 3**.

[B42: Display Select3] Setting of the third line for display unit
→ This setting is linked with that of parameter **H12**. This parameter selects the display content of the third line for display unit. When "Off" is selected for this parameter, two-line display is adopted.

[B50: Auto Zero Exe] Execution of the automatic zero adjustment function
→ This setting is linked with that of parameter **M10**. This parameter executes the automatic zero adjustment function: If "Execution" is selected, this function will be started. "Now Auto Zero Executing..." is indicated while the Auto Zero function is being carried out. The result of the automatic zero adjustment is confirmed using **M11: Magflow Zero**, and if the result exceeds the rated value, the warning **82: Auto Zero Wng** will be displayed. (For more details, refer to Chapter 9: Operation.)

Setting	Function
No Execution	No execution
Execution	Automatic zero adjustment is started.

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(2) Menu C: Basic Setting items

Menu C principally contains the basic setting items for the flowtube.

NOTE

In order to ensure that correct flow rate data can be acquired, it is crucial that the nominal size, flow rate span, and meter factor of the combined remote flowtube are set. In cases where a remote flowtube is ordered at the same time as the AXFA14, or where the AXF integral flowmeter is ordered, the nominal size and meter factor will be set upon shipment from the manufacturing plant, and these will not require additional setting. If the AXFA14 is ordered separately, the default value will be set for the meter factor; accordingly, it will be necessary to set the meter factor indicated on your remote flowtube data plate.
If a flow rate span was specified upon ordering, this will be set before shipment. If this is not the case, however, it will be necessary for the appropriate value to be set by the user.

[C10: Tag No] Setting of the tag number
→ The setting for this parameter corresponds to one of the ordered items.
Up to a maximum of 16 characters can be entered for the display unit. For more details regarding the actual characters that can be used, refer to Section 5.2.2: Setting Mode.

NOTE

If a tag number is specified upon ordering, this parameter is set up before shipment; however, if this is not the case, it will be necessary for the appropriate value to be set up by the user.

[C11: Flow Damping] Setting of the damping time
→ Refer to the description of parameter **B20**.

[C20: Measure Mode] Selection of dual frequency excitation mode

Item	Description
Standard DF	Standard dual frequency excitation
Enhanced DF	Enhanced dual frequency excitation

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Enhanced DF (i.e., enhanced dual frequency excitation) is set to stabilize measurement for difficult applications, such as for high concentration slurries or low conductivity fluid. Note that this parameter is only valid when this product is used in combination with an AXF flowtube, as only supports enhanced dual frequency excitation. (Optional code HF1 or HF2)

NOTE

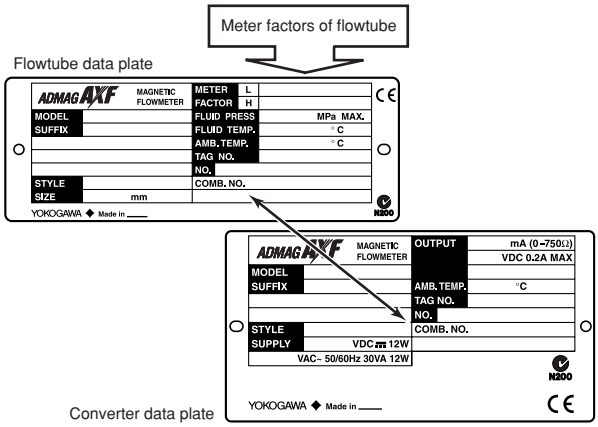
- When this product is used in combination with any flowtube that does not support enhanced dual frequency excitation and “Enhanced DF” is selected, a setting alarm will be displayed. The setting should be returned to “Standard DF” in such a case.
- When dual frequency excitation mode is changed, perform zero adjustment. For details on zero adjustment, refer to chapter 9.

[C21: Low MF] Setting of the low-frequency meter factor
This parameter sets the low-frequency meter factor for standard dual frequency excitation.

[C22: High MF] Setting of the high-frequency meter factor
This parameter sets the high-frequency meter factor for standard dual frequency excitation.

NOTE

Meter Factor Settings



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(1) Confirm that the serial number indicated by COMB. NO. on the AXFA14 converter’s data plate corresponds with the AXF remote flowtube’s serial number.
(2) Set the values that are marked in the METER FACTOR fields on the data plate for the Remote Flowtube.
(3) The meter factors are crucial in ensuring that the electromotive force is correctly in proportion to the flow velocity and are determined at the manufacturing plant by actual-flow calibration.

[C23: Low MF (EDF)] Setting of the low-frequency meter factor for EDF
This parameter sets the low-frequency meter factor as required when Enhanced DF (i.e., enhanced dual frequency excitation) is selected. If “Standard DF” has been selected for **C20: Measure Mode**, neither **C23: Low MF (EDF)** nor **C24: High MF (EDF)** is displayed, and if “Enhanced DF” is selected, the four parameters from **C21** to **C24** will be displayed.

NOTE

For the AXF integral flowmeter, refer to “Section 6.6: Precautions for the AXF integral flowmeter.”

[C24: High MF (EDF)] Setting of the high-frequency meter factor for EDF
This parameter sets the high-frequency meter factor as required when Enhanced DF (i.e., enhanced dual frequency excitation) is selected.

[C31: Nominal Size Unit] Setting of the nominal size units
This parameter selects the units used for setting of the nominal size.

[C32: Nominal Size] Setting of the nominal size
This parameter sets the nominal size of flowtube.

[C40: Base Flow Unit] Selection of flow units for the flow rate span
→ Refer to the description of parameter **B21**.

[C41: Base Time Unit] Selection of time units for the flow rate span
→ Refer to the description of parameter **B22**.

[C42: Flow Span] Setting of the flow rate span
→ Refer to the description of parameter **B23**.

[C43: Flow Decimal Pnt] Setting of the decimal point position for the instantaneous flow rate
→ Refer to the description of parameter **B24**.

[C44: Velocity Check] Display of the flow rate span velocity
This parameter displays the flow rate span for the maximum range in m/s units.

[C45: Density Unit] Setting of the density units for mass flow rate
This parameter selects the units for density as required when making settings using **C46: Mass Density**.

[C46: Mass Density] Setting of the density for mass flow rate
This parameter is necessary in situations where t, kg, g, klb or lb has been selected as the mass unit in **B21/C40: Base Flow Unit**. If a mass unit is selected in **B21/C40: Base Flow Unit** and a value of 0 is set for this parameter, the setting alarm "**57: Dens Set Err**" will be displayed. In such a case, ensure that the density is set correctly.

[C47: User Span Select] Selection of the use of special flow rate units
This parameter selects whether or not special units are used for instantaneous flow rate. Actual setting of these units is carried out using **C48: Flow User Unit** and **C49: Flow User Span**.

[C48: Flow User Unit] Setting of the special flow rate units
This parameter is used to select the special units (up to maximum 8 characters in length). These units are displayed when instantaneous flow rate is selected in the Display Mode, and they are displayed for **A20: FLOW RATE** when BRAIN communication is being carried out.

[C49: Flow User Span] Setting of the special flow rate span
This parameter sets the special span to be displayed for 100% output in the maximum range.

NOTE

Example : To set the special flow rate span to 100 dl/s
Since 100 dl (deci-liter)=10 l (liter),
"l (Liter)" is set for **B21/C40: Base Flow Unit**,
"/s" is set for **B22/C41: Base Time Unit**,
"10" is set for **B23/C42: Flow Span**,
"Yes" is set for **C47: User Span Select**,
"dl/s" is set for **C48: Flow User Unit**,
"100" is set for **C49: Flow User Span**.
"100 dl/s" is indicated for 100% output in the Display Mode.

(3) Menu D: Total Setting items

Menu D contains parameters that are relevant to totalization function settings.

[D10: Total Unit] Setting of units for totalization scale
→ Refer to the description of parameter **B30**.

[D11: Total Scale] Setting of the totalization scale
→ Refer to the description of parameter **B31**.

[D12: Total Decimal Pnt] Setting of the decimal point position for the totalization display
This parameter sets the position of the decimal point for totalization display in terms of the number of digits. Except in cases where 0 is selected, the totalized units are not displayed.

Example: When totalized value is 12345678 m^3

Item	Totalization display
0	12345678 m^3
1	1234567.8
2	123456.78
3	12345.678
4	1234.5678
5	123.45678
6	12.345678
7	1.2345678

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[D13: Total Low Cut] Setting of the totalization stop range
This parameter allows the settings to be made that prevent totalization when the flow rate is at or below the low-cut setting value. In cases where there are multiple ranges or forward/reverse ranges, low cut is carried out at the setting value for the smallest span (i.e., an integer between 0 and 10%).
Example: When the first range = 10 m^3/h, the second range = 100 m^3/h, and the Total Low Cut = 3%, no totalization is carried out at flow rates of 0.3 m^3/h or lower.

[D20: Total Execution] Operation setting for the totalization function
This parameter sets "Start" and "Stop" of the totalization function, in addition to performing the preset function for the forward totalized value and the reverse totalized value.
*: The preset function starts the count for totalization from the set value.

Item	Description
Start (initial value)	Starts totalization
Stop	Stops totalization
Preset Total	Sets the preset value for totalization display that has been specified as the forward totalized value. Preset value are determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is sellected, the count for totalization starts from the preset value. Setting of zero as the preset value allows the zero-reset function to be implemented.
Preset Rev Total	Sets the preset value for totalization display that has been specified as the reverse totalized value. Preset value are determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is sellected, the count for totalization starts from the preset value. Setting of zero as the preset value allows the zero-reset function to be implemented.

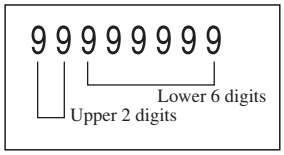
T0620.EPS

NOTE

Totalization presets can also be set up by using status input. For details regarding the setting method, refer to the descriptions of **F21**.

[D21: Ttl Set Val Lower] Setting of the totalization preset value (lower 6 digits)
This parameter sets a totalization preset value in the lower 6 digits of the 8-digit totalized value. If zero is to be set as the preset value, "000000" should be set here.

[D22: Ttl Set Val Upper] Setting of the totalization preset value (upper 2 digits)
This parameter sets a totalization preset value in the upper 2 digits of the 8-digit totalized value. If zero is to be set as the preset value, "00" should be set here.



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[D23: Ttl Switch Lower] Setting of the totalization switch value (lower 6 digits)
The totalization switch function operates to set the status output terminal (i.e., DO or DIO) to "Closed (On)" when the forward internal totalized value reaches or exceeds the totalization switch value. (For details regarding the setting method for the status output, refer to the descriptions of parameters **F20** and **F21**.)

If this function is set up, the totalization count will stop at 99999999.
D23 sets the lower 6 digits of the 8-digit totalization switch value.

[D24: Ttl Switch Upper] Setting of the totalization switch value (upper 2 digits)
This parameter sets the upper 2 digits of the 8-digit totalization switch value.

[D30: Ttl User Select] Selection of the use of special totalization unit
This parameter specifies whether or not special units are used for totalization unit. Actual setting of these units is carried out using **D31: Ttl User Unit**.

[D31: Ttl User Unit] Setting of special totalization units
Units of up to maximum 8 characters in length can be specified using this parameter. The units set with this parameter are displayed whenever totalization (i.e., FTL, RTL, DTL) is selected in the Display Mode, and they are displayed for **A30: TOTAL, A31: REV TOTAL**, and **A32: DIF TOTAL** when BRAIN communication is being carried out.

NOTE

Example: To count in 1 dl (deci-liter) steps with flow rate span=10 l/s.
Since 1 dl (deci-liter) = 0.1 l (liter),
"l (Liter)" is set for **B21/C40: Base Flow Unit**,
"/s" is set for **B22/C41: Base Time Unit**,
"10" is set for **B23/C42: Flow Span**,
"Unit/P" is set for **B30/D10: Total Unit**,
"0.1" is set for **B31/D11: Total Scale**,
"Yes" is set for **D30: Ttl User Select**,
"dl" is set for **D31: Ttl User Unit**.
"dl" is indicated for the totalized units in the Display Mode and is counted in 1 dl steps.

(4) Menu E: Pulse Setting items

Menu E contains items relevant to pulse output.

NOTE

For pulse output from the DO terminal, set **F20: DO Function** to "Pulse Output."

[E10: Pulse Unit] Setting of the pulse units
→ Refer to the description of parameter **B32: Pulse Unit**

[E11: Pulse Scale] Setting of the pulse scale
→ Refer to the description of parameter **B33: Pulse Scale**

[E12: Pulse Width] Setting of the pulse width
This parameter selects the pulse width (i.e., m/s : millisecond) that is output.

Data Range

Setting	Pulse Rate (pps)	
	Maximum Value	Minimum Value
(0) 50% Duty	11000	0.0001
(1) 0.05ms	10000	(pps: pulses per second)
(2) 0.1ms	5000	
(3) 0.5ms	1000	
(4) 1ms	500	
(5) 20ms	25	
(6) 33ms	15	
(7) 50ms	10	
(8) 100ms	5	

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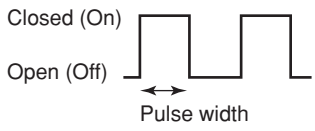
NOTE

*:The pulse width with the exception of "50% Duty" is the "Closed (On)" time for each pulse in case that "Closed (On) Act" is selected for **F22: DO Active Mode**



F0603.EPS

A limit applies to the maximum pulse scale that can be set with respect to the pulse width. If a value in excess of this limit is set, a setting alarm will be displayed.

[E13: Pulse Low Cut] Setting of the pulse output stop range
This parameter allows the settings to be made which prevent pulse output when the flow rate is at or below the low-cut setting value. In cases where there are multiple ranges or forward/reverse ranges, low cut is carried out at the setting value for the smallest span (i.e., an integer between 0 and 10%).
Example: When the first range = 10 m^3/h, the second range = 100 m^3/h, and the Pulse Low Cut = 3%, no pulse output is carried out at flow rates of 0.3 m^3/h or lower.

(5) Menu F: Status Functions Setting items

Menu F contains setting items relevant to status Input/Output functions.

[F20: DO Function] Setting of the function for the DO status output terminal

This parameter sets the function for the DO (status output) terminal.

Setting	Function	Description
No Function	Stops output (i.e., inactive condition)	As no function is set, there is no output.
Pulse Output	Pulse output	Pulse output is carried out.
Alarm Output	Output upon alarm	Refer to Alarms (Section 6.5).
Warning Output	Output upon warning	
Total Switch(O)	Totalization switch output	Status output is carried out when the forward internal totalized value reaches or exceeds the totalization switch value. The totalization switch value is determined using **D23: Ttl Switch Lower** and **D24: Ttl Switch Upper**.
H/L Alarm(O)	H/L alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low flow rate limit (L), or when it equals or exceeds the high flow rate limit (H). These limit values are determined using **G10: Low Alarm** and **G11: High Alarm**.
HH/LL Alarm(O)	HH/LL alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low-low flow rate limit (LL), or when it equals or exceeds the high-high flow rate limit (HH). These limit values are determined using **G12: Low Low Alarm** and **G13: High High Alarm**.To output "HH/LL Alarm" as an alarm, set **G33: Alm-HH/LL** to "Yes."
Fwd/Rev Rngs(O)	Forward/reverse flow rate measurement	When flow is in the reverse direction, switching to the reverse range is carried out automatically, measurement is performed, and status output is carried out.
Auto 2 Rngs(O)	Automatic 2 ranges switching	This function ensures that when the instantaneous flow rate exceeds 100% of the range, transition to the next range is carried out automatically. Status output is carried out upon range switching.
Auto 3 Rngs(O)	Automatic 3 ranges switching (Note 1)	
Auto 4 Rngs(O)	Automatic 4 ranges switching (Note 1)	
Ext 2 Answer(O)	Answerback: 2 ranges switching via external status input	When range switching is carried out in response to external status input, status output is performed in the form of an answerback to indicate the range currently being used.

Note 1: When these functions are selected, two terminals become necessary for status output, the DO and DIO terminals which cannot be used for other functions. Accordingly, the setting for **F20: DO Function** is automatically adopted as the setting for **F21: DIO Function**. (Setting of these two functions is not possible using **F21: DIO Function**.)

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[F21: DIO Function] Setting of the function for the DIO status input/output terminal
This parameter sets the function for the DIO (status input/output) terminal.

Setting	Function	Description
No Function	No function	As no function is set, there is no input and output.
Alarm Output	Output upon alarm	Refer to Alarms (Section 6.5).
Warning Output	Output upon warning	
Total Switch(O)	Totalization switch output	Status output is carried out when the forward internal totalized value reaches or exceeds the totalization switch value. The totalization switch value is determined using **D23: Ttl Switch Lower** and **D24: Ttl Switch Upper**.
H/L Alarm(O)	H/L alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low flow rate limit (L), or when it equals or exceeds the high flow rate limit (H). These limit values are determined using **G10: Low Alarm** and **G11: High Alarm**.
HH/LL Alarm(O)	HH/LL alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low-low flow rate limit (LL), or when it equals or exceeds the high-high flow rate limit (HH). These limit values are determined using **G12: Low Low Alarm** and **G13: High High Alarm**. To output "HH/LL Alarm" as an alarm, set **G33: Alm-HH/LL** to "Yes."
Fwd/Rev Rngs(O)	Forward/reverse flow rate measurement	When flow is in the reverse direction, switching to the reverse range is carried out automatically, measurement is performed, and status output is carried out.
Auto 2 Rngs(O)	Automatic 2 ranges switching	This function ensures that when the instantaneous flow rate exceeds 100% of the range, transition to the next range is carried out automatically. Status output is carried out upon range switching.
Auto 3 Rngs(O)	Automatic 3 ranges switchings (Note 1)	
Auto 4 Rngs(O)	Automatic 4 ranges switchings (Note 1)	
Ext 2 Answer(O)	Answerback: 2 ranges switching via external status input	When range switching is carried out in response to external status input, status output is performed in the form of an answerback to indicate the range currently being used.
0% Signal Lock(I)	0% signal lock via external status input	Based on the external status input, the instantaneous flow rate indication is forcibly set to 0% (i.e., 4 mA), and both totalization and pulse outputs are halted. This setting has precedence over the output signal whenever an alarm occurs. When the 0% signal lock is canceled, the instantaneous flow rate is restored in accordance with the time constant originally set using **B20/C11: Flow Damping**.
Ext Auto Zero(I)	Automatic zero adjustment via external status input	Automatic zero adjustment is carried out in response to external status input. For more details regarding automatic zero adjustment, refer to Chapter 9: Operation.
Ext Ttl Set(I)	Forward totalization preset via external status input	The totalization display value is preset or reset to zero in accordance with the external status input. The preset value is determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is selected for **D20: Total Execution**, the count for totalization starts from the preset value.
Ext R Ttl Set(I)	Reverse totalization preset via external status input	
Ext 2 Ranges(I)	2 ranges switching via external status input	This function allows the switching of 2 ranges in response to status input for a single direction only.

Note 1: When these functions are selected, two terminals become necessary for status output, the DO and DIO terminals which cannot be used for other functions.

T0623.EPS

[F22: DO Active Mode] Setting of the active mode for DO terminal

Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using this parameter. Operating patterns are reversed when the active mode has been set to "Open (Off) Act."

Selected function	Condition of DO terminal	
	Open (Off)	Closed (On)
Pulse Output (see Example 1)	Open (Off) when pulses are output.	Closed (On) when pulses are output.
Alarm Output (see Example 2)	Good (normal)	Alarm status
Warning Output	Good (normal)	Warning status
Total Switch(O) (see Example 3)	Below setting value	Equal or above setting value
H/L Alarm(O)	Normal	H/L alarm status
HH/LL Alarm(O)	Normal	HH/LL alarm status
Fwd/Rev Rngs(O)	Forward direction	Reverse direction

Note: For "Auto 2 Rngs(O)," "Auto 3 Rngs(O)", "Auto 4 Rngs(O)", and "Ext 2 Answer(O)", see the **Multiple ranges setting** section.

T0624.EPS

[F23: DIO Active Mode] Setting of the active mode for DIO terminal

Operations are performed in accordance with the following table when the active mode has been set to "Closed/Short Act" using this parameter. Operating patterns are reversed when the active mode has been set to "Open/Open Act."

Selected function	Condition of DIO (O) terminal	
	Open (Off)	Closed (On)
Alarm Output (see Example 2)	Good (normal)	Alarm status
Warning Output	Good (normal)	Warning status
Total Switch(O) (see Example 3)	Below setting value	Equal or above setting value
H/L Alarm(O)	Normal	H/L alarm status
HH/LL Alarm(O)	Normal	HH/LL alarm status
Fwd/Rev Rngs(O)	Forward direction	Reverse direction

Note: For "Auto 2 Rngs(O)," "Auto 3 Rngs(O)", "Auto 4 Rngs(O)", and "Ext 2 Answer(O)", see the **Multiple ranges setting** section.

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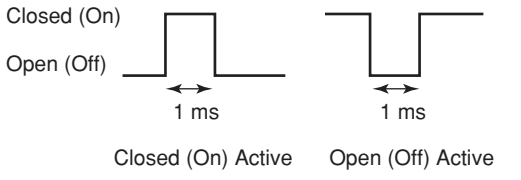
Selected function	Condition of DIO (I) terminal	
	Open	Short
0% Signal Lock (I) (see Example 4)	Normal	Signal locked status
Ext Auto Zero (I)	Normal	Start of automatic zero adjustment
Ext Ttl Set (I)	Normal	Forward totalization preset
Ext R Ttl Set (I)	Normal	Reverse totalization preset

Note: For "Ext 2 Ranges(I)," see the **Multiple ranges setting** section.
*: "DIO (O)" indicates DIO function is used for output. "DIO (I)" indicates DIO function is used for input.

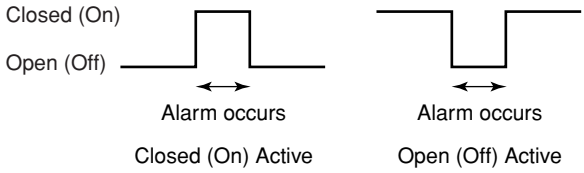
T0626.EPS

Example 1: When the "Pulse Output" function is selected for the DO terminal and the **E12: Pulse Width** is "1 ms", the following signals are output from the terminal.



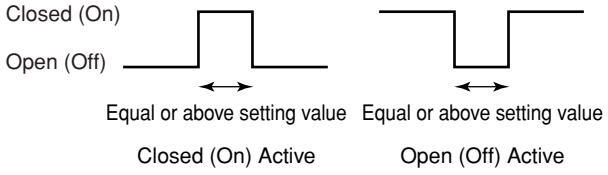
F0604-1.EPS

Example 2: When the "Alarm Output" function is selected for the DO or DIO (O) terminal, the following signals are output from the terminal.



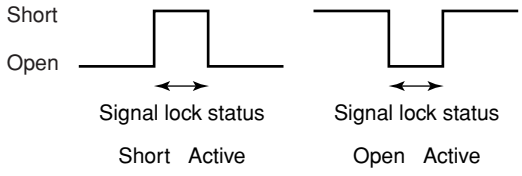
F0604-2.EPS

Example 3: When the "Total Switch (O)" function is selected for the DO or DIO (O) terminal, the following signals are output from the terminal.



F0604-3.EPS

Example 4: When the "0% Signal Lock (I)" function is selected for the DIO (I) terminal, the following signals are input to the terminal.



F0604-4.EPS

NOTE

Multiple ranges setting

Parameters from **F30** to **F41** are used with the automatic multiple ranges and the multiple ranges switching via an external status input. The followings will describe the setting method for each range.

The multiple ranges use the following parameters:

[B23: Flow Span] Setting of the flow rate span (Setting of the forward No.1 range)

[F30: Forward Span 2] Setting of the forward No.2 range

[F31: Forward Span 3] Setting of the forward No.3 range

[F32: Forward Span 4] Setting of the forward No.4 range

[F33: Reverse Span 1] Setting of the reverse No.1 range

[F34: Reverse Span 2] Setting of the reverse No.2 range

[F40: Auto Range Hys] Setting of the automatic multiple ranges hysteresis width.

[F41: Bi Direction Hys] Setting of the forward/ reverse flow measurement hysteresis width

Multiple Ranges Setting 1: Automatic multiple ranges switching

- When the instantaneous flow rate exceeds 100% of the range, transition to the next range (up to four ranges) is carried out automatically. Furthermore, when the flow is in reverse, the reverse range is automatically selected.
- Range switching can be confirmed according to the status of the DO and DIO status output terminals. Refer to Table 6.4.1: Status Output for Automatic Multiple Ranges Switching for details of status output conditions for each range.

Status Output for Automatic Multiple Ranges Switching

Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using **F22: DO Active Mode** or "Closed/Short Act" using **F23: DIO Active Mode**. Operating patterns are reversed when the active mode has been set to "Open (Off) Act" using **F22: DO Active Mode** or "Open/Open Act" using **F23: DIO Active Mode**.

Table 6.4.1 Status Output for Automatic Multiple Ranges Switching

Parameter setting		Function		Status output		
				DO	DIO	
F20	F21				DIO (O)	DIO (I)
No Function	No Function	Forward single range		–	–	–
Fwd/Rev Rngs (O)	No Function	Auto forward/ reverse 1 range	Forward	Open	–	–
			Reverse	Closed	–	–
No Function	Fwd/Rev Rngs (O)		Forward	–	Open	–
			Reverse	–	Closed	–
Auto 2 Rngs (O)	No Function	Auto forward 2 ranges	Forward 1 range	Open	–	–
			Forward 2 range	Closed	–	–
No Function	Auto 2 Rngs (O)		Forward 1 range	–	Open	–
			Forward 2 range	–	Closed	–
Auto 3 Rngs (O)	Auto 3 Rngs (O)	Auto forward 3 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Forward 3 range	Open	Closed	–
Auto 4 Rngs (O)	Auto 4 Rngs (O)	Auto forward 4 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Forward 3 range	Open	Closed	–
			Forward 4 range	Closed	Closed	–
Fwd/Rev Rngs (O)	Auto 2 Rngs (O)	Auto forward/ reverse 2 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Open	Closed	–
			Reverse 1 range	Closed	Open	–
			Reverse 2 range	Closed	Closed	–
Auto 2 Rngs (O)	Fwd/Rev Rngs (O)		Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Reverse 1 range	Open	Closed	–
			Reverse 2 range	Closed	Closed	–

*: "No Function" is the default value. Only DO or DIO terminals are used for single or dual ranges; accordingly, the unused terminal remains at the default value (i.e., No Function) and can therefore be used for other functions.

*: "DIO (O)" indicates DIO function is used for output.

T0627.EPS

Parameter setting sequence (for automatic multiple ranges switching)

F20: DO Function
Select a function.

F21: DIO Function
Select a function.

F22: DO Active Mode
Select whether DO output is to be "Closed (On) Act" or "Open (Off) Act".

F23: DIO Active Mode
Select whether DIO output is to be "Closed/Short Act" or "Open/Open Act".

Select a function (Note 1)
No Function: Output is stopped (other functions may be selected)
Fwd/Rev Rngs(O): Forward/reverse flow rate measurement
Auto 2 Rngs(O): Automatic 2-ranges switching
Auto 3 Rngs(O): Automatic 3-ranges switching
Auto 4 Rngs(O): Automatic 4-ranges switching

Refer to Table 6.4.1 and set **F20** or **F21**.
Note 1: "DIO (O)" indicates DIO function is used for output.

B23: Flow Span Forward No.1 range	**F30: Forward Span 2** Forward No.2 range	**F31:Forward Span 3** Forward No.3 range
F32:Forward Span 4 Forward No.4 range	**F33:Reverse Span 1** Reverse No.1 range	**F34:Reverse Span 2** Reverse No.2 range

Set the spans for the ranges to be used.
No.1 range≦No.2 range≦No.3 range≦No.4 range

If "instantaneous flow rate % (FR)" is selected for Display Mode and **A10: FLOW RATE (%)** is selected for BRAIN communication, the instantaneous flow rate % and following symbols will be displayed only for multiple ranges and forward/reverse flow measurement.
Forward No.1 range: [F1] Reverse No.1 range: [R1]
Forward No.2 range: [F2] Reverse No.2 range: [R2]
Forward No.3 range: [F3]
Forward No.4 range: [F4]

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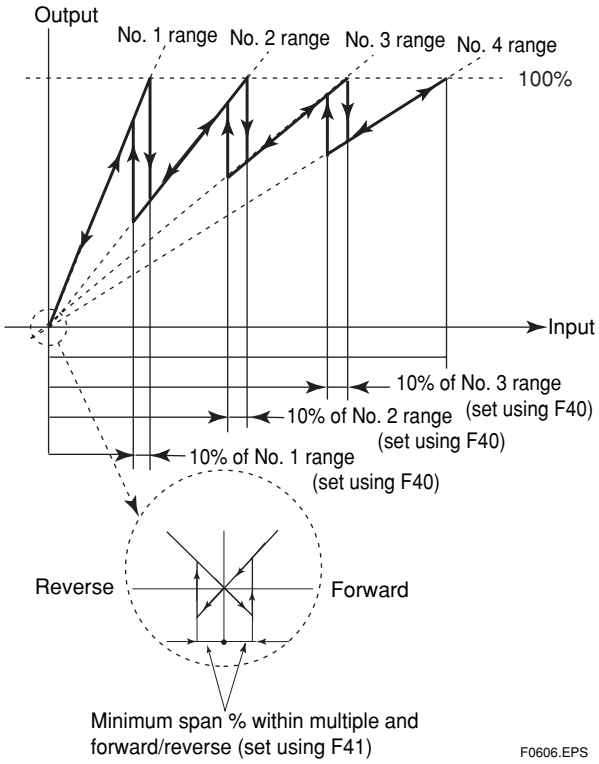


Figure 6.4.1 Multiple Ranges and Hysteresis Widths

NOTE

For more details regarding the setting of hysteresis width, refer to the description of setting parameter for **F40: Auto Range Hys** and **F41: Bi Direction Hys**.

Multiple Ranges Setting 2: Multiple ranges switching via external status input

- For both the forward and reverse directions, switching of up to two ranges can be carried out based on a status input; however, switching between directions is not possible. Switching between forward and reverse ranges is carried out automatically only when the flow direction reverses.
- DIO terminal is used for multiple ranges switching. For more details, refer to Table 6.4.2: Multiple Ranges Switching via External Status Input.

Multiple Ranges Switching via External Status Input

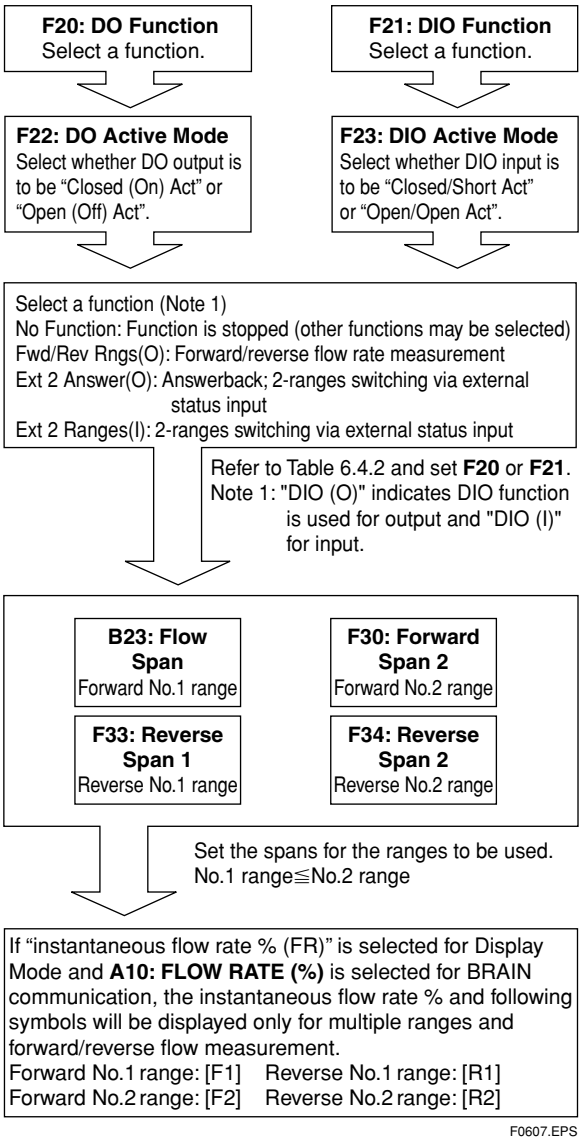
Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using **F22: DO Active Mode** or "Closed/Short Act" using **F23: DIO Active Mode**. Operating patterns are reversed when the active mode has been set to "Open (Off) Act" using **F22: DO Active Mode** or "Open/Open Act" using **F23: DIO Active Mode**.

Table 6.4.2 Multiple Ranges Switching via External Status Input

Parameter setting		Function		Status output		
				DO	DIO	
F20	F21				DIO (O)	DIO (I)
No Function	Ext 2 Ranges(I)	External forward 2 ranges	Forward 1 range	–	–	Open
			Forward 2 range	–	–	Short
Fwd/Rev Rngs(O)	Ext 2 Ranges(I)	External forward/ reverse 2 ranges	Forward 1 range	Open	–	Open
			Forward 2 range	Open	–	Short
			Reverse 1 range	Closed	–	Open
			Reverse 2 range	Closed	–	Short
Ext 2 Answer(O)	Ext 2 Ranges(I)	External forward 2 ranges, with answerback	Forward 1 range	Open	–	Open
			Forward 2 range	Closed	–	Short

*: "No Function" is the default value. Only DIO terminal is used for dual ranges; accordingly, the unused DO terminal remains at the default value (i.e., No Function) and can therefore be used for other functions.
*: "DIO (I)" indicates DIO function is used for input. T0628.EPS

Parameter setting sequence (for multiple ranges switching via external status input)


F20: DO Function
Select a function.
F21: DIO Function
Select a function.
F22: DO Active Mode
Select whether DO output is to be "Closed (On) Act" or "Open (Off) Act".
F23: DIO Active Mode
Select whether DIO input is to be "Closed/Short Act" or "Open/Open Act".
Select a function (Note 1)
No Function: Function is stopped (other functions may be selected)
Fwd/Rev Rngs(O): Forward/reverse flow rate measurement
Ext 2 Answer(O): Answerback; 2-ranges switching via external status input
Ext 2 Ranges(I): 2-ranges switching via external status input
Refer to Table 6.4.2 and set F20 or F21.
Note 1: "DIO (O)" indicates DIO function is used for output and "DIO (I)" for input.
B23: Flow Span
Forward No.1 range
F30: Forward Span 2
Forward No.2 range
F33: Reverse Span 1
Reverse No.1 range
F34: Reverse Span 2
Reverse No.2 range
Set the spans for the ranges to be used.
No.1 range≦No.2 range
If "instantaneous flow rate % (FR)" is selected for Display Mode and A10: FLOW RATE (%) is selected for BRAIN communication, the instantaneous flow rate % and following symbols will be displayed only for multiple ranges and forward/reverse flow measurement.
Forward No.1 range: [F1] Reverse No.1 range: [R1]
Forward No.2 range: [F2] Reverse No.2 range: [R2]
F0607.EPS

[F40: Auto Range Hys] Setting of automatic range-switching hysteresis width
Automatic switching takes place for multiple range switching when 100% of the range is exceeded, and this parameter allows a hysteresis width to be set for this switching.
Refer to Figure 6.4.1: Multiple Ranges and Hysteresis Widths.

[F41: Bi Direction Hys] Setting of forward/reverse flow measurement hysteresis width
This parameter sets the hysteresis for forward/reverse flow rate measurement as a % value of the minimum flow span.
Refer to Figure 6.4.1: Multiple Ranges and Hysteresis Widths.

(6) Menu G: Alarm Setting items

(Refer to Section 6.5: Alarm Functions for more details.)

Menu G principally contains setting items relevant to alarms.

[G10: Low Alarm] Low alarm setting
This parameter sets the low limit (L) alarm value, and this is done using a % value of the maximum span.

- A setting value of -110% indicates that the alarm is disabled.

[G11: High Alarm] High alarm setting
This parameter sets the high limit (H) alarm value, and this is done using a % value of the maximum span.

- A setting value of 110% indicates that the alarm is disabled.

[G12: Low Low Alarm] Low-low alarm setting
This parameter sets the low-low limit (LL) alarm value, and this is done using a % value of the maximum span.

- A setting value of -110% indicates that the alarm is disabled.

[G13: High High Alarm] High-high alarm setting
This parameter sets the high-high limit (HH) alarm value, and this is done using a % value of the maximum span.

- A setting value of 110% indicates that the alarm is disabled.

NOTE

Setting of -110% or 110% results in the corresponding function being disabled; accordingly, settings can be combined to implement only high alarms or low alarms, etc.

Output Example 1

The high-high alarm (HH) is set to 90% or more of the flow rate span; the low-low alarm (LL), to 20% or less; the high alarm (H), to 80% or more; and the low alarm (L), to 30% or less.

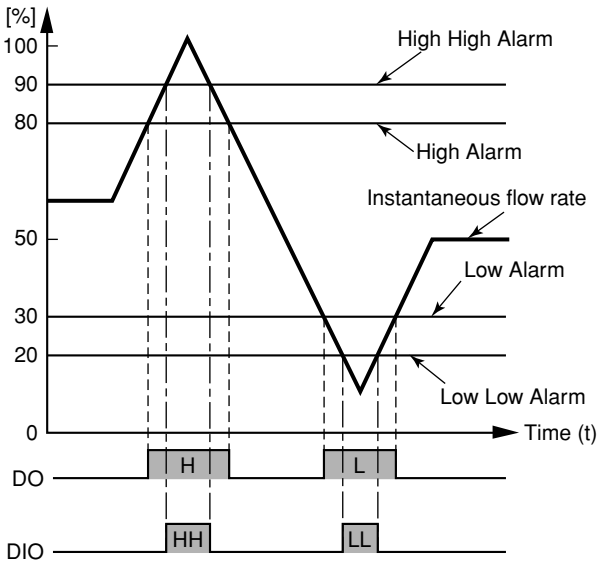
Settings are:

G10: Low Alarm = 30%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 90%



Select "H/L Alarm(O)" for **F20: DO Function**
Select "HH/LL Alarm(O)" for **F21: DIO Function**
Select "Closed (On) Act" for **F22: DO Active Mode**
Select "Closed/Short Act" for **F23: DIO Active Mode**

F0608.EPS

Output Example 2

The high alarm (H) is set to 80% or more of the flow rate span; the low-low alarm (LL), to 20% or less.

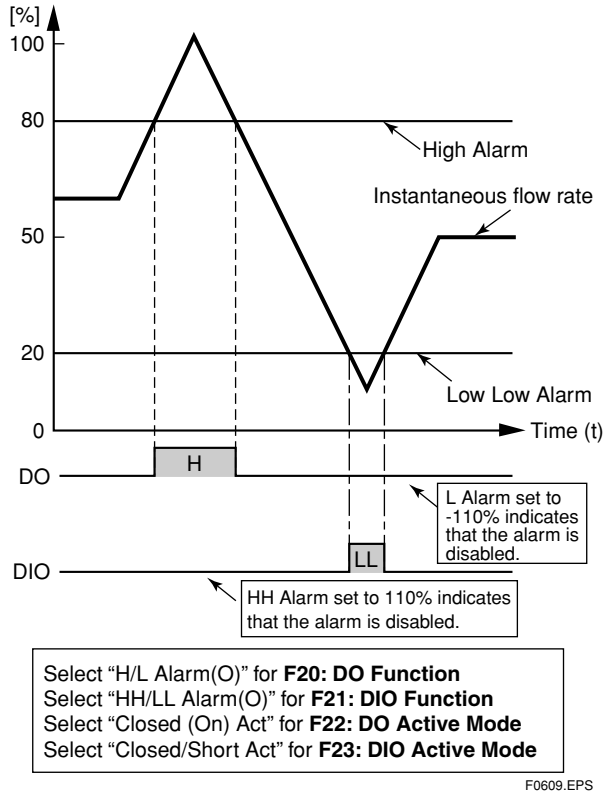
Settings are:

G10: Low Alarm = -110%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 110%



Output Example 3

The high alarm (H) is set to 80% or more of the flow rate span; the high-high alarm (HH), to 90% or more.

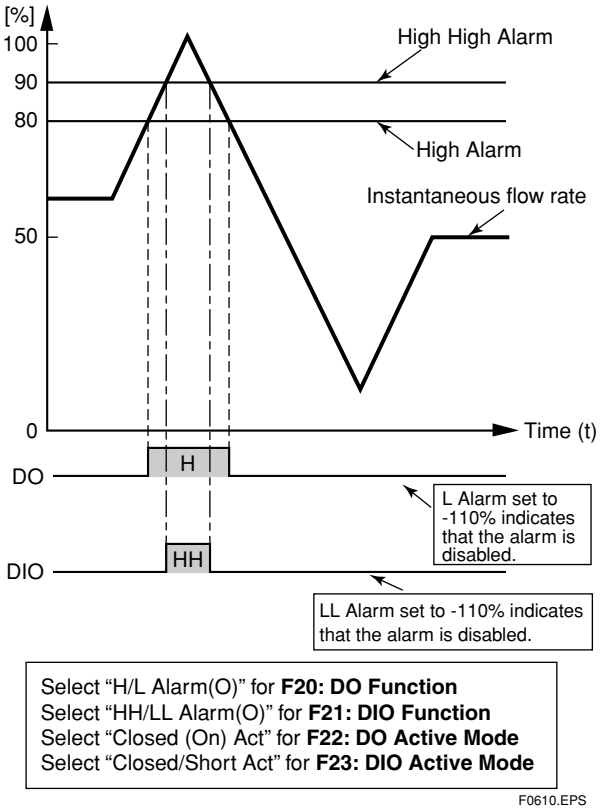
Settings are:

G10: Low Alarm = -110%

G11: High Alarm = 80%

G12: Low Low Alarm = -110%

G13: High High Alarm = 90%



NOTE

- Although the same items can be selected using the DO terminal (selected for **F20**) and the DIO terminal (selected for **F21**), output is identical for both.
- Setting values of -110% and 110% are used to disable corresponding functions; and accordingly, status output can be customized for specific purposes.

[G14: H/L Alarm Hys] Setting of upper/lower alarm value hysteresis width
This parameter sets the hysteresis width for upper and lower alarm value, using a % value of the maximum span.

Output Example

The hysteresis width is set to 5%.

Settings are:

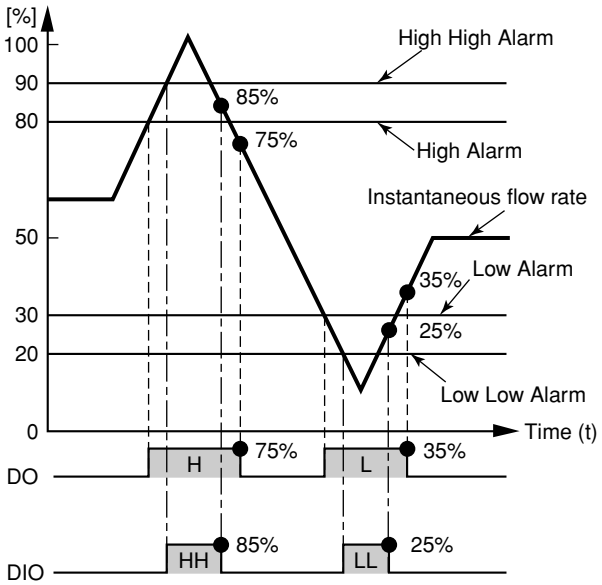
G10: Low Alarm = 30%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 90%

G14: H/L Alarm Hys = 5%



Select "H/L Alarm(O)" for **F20: DO Function**
Select "HH/LL Alarm(O)" for **F21: DIO Function**
Select "Closed (On) Act" for **F22: DO Active Mode**
Select "Closed/Short Act" for **F23: DIO Active Mode**

F0611.EPS

[G21: 4-20mA Alarm Out] Setting of the current output during an alarm occurrence
This parameter can be used to set up the current output during alarm occurrence in advance.

Setting	Function
2.4mA or Less	Fixed at 2.4 mA or less
4.0mA	Fixed at 4 mA
Hold	Fixed current value when an alarm occured.
21.6mA or More	Fixed at 21.6 mA or more

T0629.EPS

[G22: 4-20mA Burn Out] Display of the current output during a CPU failure
This parameter displays the current output direction for a CPU failure (i.e., burnout). Note that communication will not be possible if such a failure occurs.
With the standard specification, this is set to High and 25mA is output when a failure occurs. Low is setup for optional code C1, and in such a case, 0mA is output when a failure occurs.

NOTE

The current output direction for a CPU failure (i.e., burnout) can be changed. Refer to selection 10.2.1: Setting of Burnout Switch.

[G30: Alm-Setting] Alarm recognition of "Setting Alarm"
This parameter specifies whether the setting alarm will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0630.EPS

[G31: Alm-Sig Over] Alarm recognition of "Signal Overflow Alarm"
This parameter specifies whether the signal overflow in process alarms will be recognized as an alarm. A signal overflow occurs when there is an error in the input signal.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0631.EPS

[G32: Alm-Emp Pipe] Alarm recognition of "Empty Pipe Alarm"
This parameter specifies whether the empty pipe (flowtube is not filled with fluid) in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0632.EPS

[G33: Alm-HH/LL] Alarm recognition of "HH/LL Alarm" (Refer to the descriptions of **G12** and **G13** for more details regarding HH and LL alarms.)
This parameter specifies whether HH/LL alarm in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0633.EPS

NOTE

To set "HH/LL Alarm" as an alarm, it is necessary to set "HH/LL Alarm(O)" according to **F20: DO Function** or **F21: DIO Function**, and set **G12: Low Low Alarm** or **G13: High High Alarm** as well.

[G34: Alm-Adhesion] Alarm recognition of "Adhesion Alarm"
This parameter specifies whether the electrode adhesion alarm in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0634.EPS

NOTE

The AXFA14 or the AXF integral flowmeter has three different type of alarm (i.e., system alarms, process alarms, and setting alarms). For setting alarms and process alarms, settings are made with **G30**, **G31**, **G32**, **G33** and **G34** to specify whether these will be recognized as an alarm. Refer to Section 6.5: Alarm Functions for more details regarding the content of each alarm and the effect of alarm recognition on output.

[G40: Operation Time] Display of operation time
This parameter is used to display the operation time. The operation time is the total time that is counted while the device works actually.
When the power supply is off, the operation time is not counted.
For example, "1D23:45" indicates an operation time of 1 day, 23 hours, and 45 minutes.

IMPORTANT

Use this value as a rough guideline because the operation time has an error.

[G41: Alm Record1] Alarm record1
This parameter is used to display the most-recent alarm, and the alarms that can be displayed are as follows.

Alarm Items

Item	Description
: 16 space characters (i.e., no display)	No issuing of alarms
10 : uP Fault	Microprocessor (CPU) failure
11 : EEPROM Fault	EEPROM failure
12 : A/D(H) Fault	A/D converter failure (at high frequency
13 : A/D(L) Fault	A/D converter failure (at low frequency side)
14 : A/D(Z) Fault	A/D converter failure (detection of adhesion)
15 : Coil Open	Flowtube coil is open-circuit
16 : EEPROM Dflt	EEPROM returns to default values
18 : Power off	Power supply is off.
19 : Inst Pwr Fail	Instantaneous power fail for tens of milliseconds. After this fail is released, outputs reach the previous value immediately.
28 : WDT	The return from excessive instantaneous noise. After the noise is released, output return the normal condition.
30 : Sig Overflow	Input signal error
31 : Empty Pipe	Flowtube is not filled with fluid
33 : Adhesion Alm	Insulation adhered to electrode

T0635.EPS

NOTE

Records for "30: Sig Overflow" are kept only when **G31** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected). Records for "31: Empty Pipe" are kept only when **G32** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected). Records for "33: Adhesion Alm" are kept only when **G34** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected).

[G42: Alm Record Time1] Display the operation time of alarm record1
This parameter is used to display the operation time at which the alarm indicated by **G41: Alm Record1** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

IMPORTANT

Use these values as a reference because the time of alarm records (1 to 4) have an error.

[G43: Alm Record2] Alarm record2
This parameter is used to display the second most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G44: Alm Record Time2] Display the operation time of alarm record2
This parameter is used to display the operation time at which the alarm indicated by **G43: Alm Record2** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

[G45: Alm Record3] Alarm record3
This parameter is used to display the third most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G46: Alm Record Time3] Display the operation time of alarm record3
This parameter is used to display the operation time at which the alarm indicated by **G45: Alm Record3** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

[G47: Alm Record4] Alarm record4
This parameter is used to display the fourth most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G48: Alm Record Time4] Display the operation time of alarm record4
This parameter is used to display the operation time at which the alarm indicated by **G47: Alm Record4** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

(7) Menu H: Display Setting items

Menu H contains setting items relevant to the display unit.

[H10: Display Select1] Setting of the first line for display unit
→ Refer to the description for parameter **B40**
This parameter selects the display content of the first line for display unit.

[H11: Display Select2] Setting of the second line for display unit
→ Refer to the description for parameter **B41**
This parameter selects the display content of the second line for display unit.

[H12: Display Select3] Setting of the third line for display unit
→ Refer to the description for parameter **B42**
This parameter selects the display content of the third line for display unit.

[H20: Display Cycle] Setting of the display cycle
This parameter sets the cycle for the display-response speed of display unit. Settings should be made in accordance with the measurement environment by, for example, setting a longer display cycle when using the equipment in low temperatures.

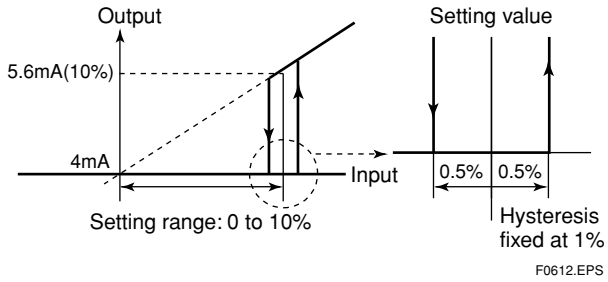
[H30: Language] Selection of language used for the display unit
→ Refer to the description for parameter **B10**
This parameter can be used to select the language for the display unit.

(8) Menu J: Auxiliary Function Setting items

Menu J contains setting items such as the flow direction, rate limits, and current output limits.

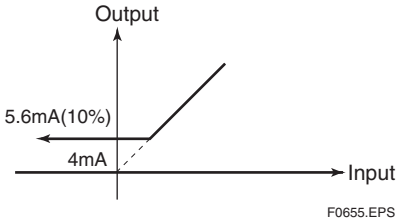
[J10: 4-20mA Low Cut] Setting of the low-cut range for current output
This parameter is used to force current output to 0% (i.e., 4mA) in the vicinity of 0% output, and setting for the current (4 to 20 mA) output low cut is made using a percentage of the smallest flow rate span. However, the low cut function will be terminated if this parameter is set to 0%.
The indications of the instantaneous flow rates (%, Actual instantaneous flow rate, mA, Bar graph) on the display unit are the same action.

Example: Situation where low cut is set to 10%



[J11: 4-20mA Low Lmt] Setting of the low limit for current output
This parameter is used to restrict low current portions of current (4 to 20mA) output, and it is initially set to -20%. Setting should be performed when a higher value is required for the lower limit.
The indications of the instantaneous flow rates (%, Actual instantaneous flow rate, mA, Bar graph) on the display unit are the same action.

Example: Situation where low limit is set to 10%



NOTE

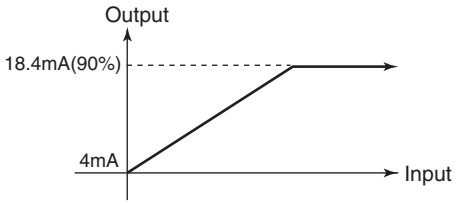
If "2.4mA or less" has been set for **G21:4-20mA Alarm Out**, 2.4mA or less will be output upon an alarm occurrence, regardless of the low limit setting.

NOTE

- If the setting value for the low limit is not less than the high limit value (as set using **J12: 4-20mA High Lmt**), the setting alarm "54: 4-20 Lmt Err" will be displayed.
- This parameter has no effect on pulse output or the totalization function.

[J12: 4-20mA High Lmt] Setting of the high limit for current output
This parameter is used to restrict high current portions of current (4 to 20mA) output, and it is initially set to 120%. Setting should be performed when a lower value is required for the higher limit.
The indications of the instantaneous flow rates (%, Actual instantaneous flow rate, mA, Bar graph) on the display unit are the same action.

Example: Situation where high limit is set to 90%



F0656.EPS

NOTE

If "21.6mA or more" has been set for **G21:4-20 mA Alarm Out**, 21.6mA or more will be output upon an alarm occurrence, regardless of the high limit setting.

[J20: Flow Direction] Setting of the flow direction
Upon shipment from the manufacturing plant, the system is setup such that flow in the same direction, as shown by the direction of the arrow mark on the flowtube, will be measured as forward flow; however, this parameter can be used to set "Reverse" so that flow in the opposite direction to the arrow mark will be treated as forward.

Note: This function does not apply to measurement in both the forward and reverse directions, although this can be setup using by selecting "Fwd/Rev Rngs(O)" from either **F20: DO Function** or **F21: DIO Function**.

Setting	Function
Forward	Forward direction corresponds with arrow mark.
Reverse	Forward direction is opposite to arrow mark.

T0638.EPS

[J21: Rate Limit] Setting of the rate limit value
- This parameter is used in situations where sudden noise cannot be eliminated by increasing the damping time constant.
- In situations where step signals or sudden noise signals caused by slurries or the like are entered, this parameter is used to set the standard for determining whether an input corresponds to a flow measurement or noise. Specifically, this determination is made using upper and lower rate limits and using the dead time.
- Rate limit values are set using a percentage of the smallest range. The range of deviation per one calculation cycle should be input.

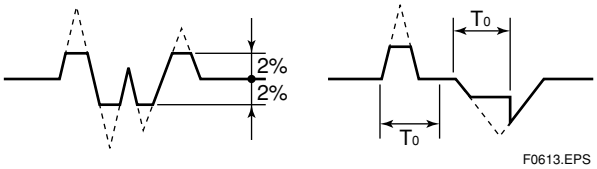
[J22: Dead Time] Setting of dead time
This parameter sets the time for application of the rate limit, and if a value of 0 is set, the rate limit function will be terminated.

NOTE

Determining rate limit value and dead time

Rate limit value:
Determines the level for output fluctuation cutoff. For example, if this is set to 2%, noise above 2% will be eliminated as shown in the diagram.

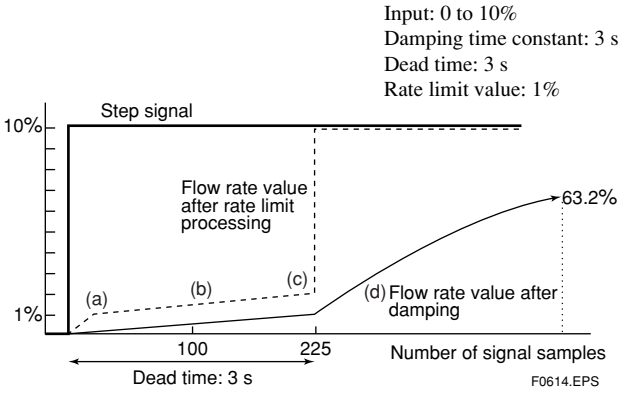
Dead time (T_0):
This is to be determined using the output fluctuation width. If noise exceeds the dead time as shown in the diagram below, the dead time should be made longer.



F0613.EPS

- Signal processing method:
  A fixed upper and lower limit value is setup with respect to the primary delay response value for the flow rate value obtained during the previous sampling, and if the currently sampled flow rate is outside these limits, then the corresponding limit is adopted as the current flow rate value. In addition, if signals which breach the limits in the same direction occur over multiple samples (i.e., within the dead time), it is concluded that the corresponding signal is a flow rate signal.

Example 1: Step input



(1) In comparison with the previous value at (a), it is determined that the signal is in excess of the rate limit value and the response becomes 1%. However, the actual output applies damping, and therefore the output turns out to be as indicated by the solid line.

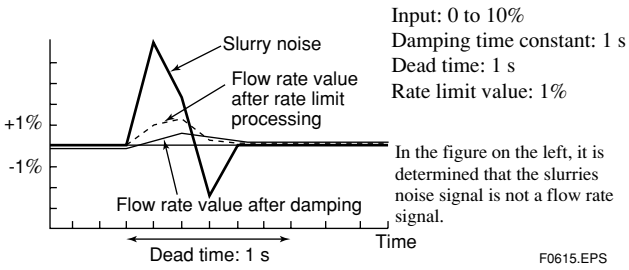
(2) Subsequent flow values within the dead time zone correspond to signals of post-damping flow value + rate limit value (1%).

(3) Since input signals do not return to within the rate limit value during the dead time, it is determined at (c) that this signal is a flow rate signal.

(4) The output signal becomes a damped curve and compliance with the step signal begins.

Three seconds after determination of a flow rate signal in the above figure, a level of 63.2% is reached.

Example 2: Slurry noise


Input: 0 to 10%
Damping time constant: 1 s
Dead time: 1 s
Rate limit value: 1%
Slurry noise
Flow rate value after rate limit processing
+1%
-1%
Flow rate value after damping
In the figure on the left, it is determined that the slurries noise signal is not a flow rate signal.
Time
Dead time: 1 s
F0615.EPS

[J23: Pulsing Flow] Selection of pulsing flow support

In a situation where pulsating flow causes error in the average flow value, due to the application of a plunger pump, this parameter provides functionality whereby calculation is controlled and variations in flow rate are followed.

Setting	Function
No	Normal
Yes	Support for pulsing flow

T0637.EPS

[J24: T/P Damp Select] Setting of damping operation

This parameter is used to select that the flow rate value obtained through damping calculation for totalization and pulse output or the instantaneous flow rate value (no damping) for totalization and pulse output.

Setting	Function
Damp	Damping
No Damp	No damping

T0653.EPS

[J30: Power Synch] Setting of power synchronization

This parameter sellects whether or not the internal frequency is to be synchronized with that of the power supply.

Setting	Function
No	Not synchronized
Yes	Synchronized

T0639.EPS

[J31: Power Frequency] Setting of power frequency

When “Yes” (i.e., in synchrony) has been selected for **J30: Power Synch**, this parameter is used to display the power supply frequency. If “No” (i.e., not synchronized) has been selected, the power supply frequency is to be specified.

IMPORTANT

In situations where a DC power supply is used for converters, set the local commercial power frequency in area where the converter is installed.
Set “No” for **J30: Power Synch** and the local commercial power frequency for **J31: Power Frequency**.

Following settings are necessary by power supply and by flow tube size.

Power Supply Code 1
(100 to 240 V AC or 100 to 120 V DC)

		Size 2.5 mm (0.1 in.) to 400 mm (16 in.)
AC power supply	J30	Power synchronous (Yes)
	J31	No setting
DC power supply	J30	Power asynchronous (No)
	J31	Local commercial power frequency

T0642-1.EPS

Power Supply Code 2 (24 V AC/DC)

		Size 2.5 mm (0.1 in.) to 400 mm (16 in.)
AC power supply	J30	Power asynchronous (No)
	J31	Local commercial power frequency
DC power supply	J30	Power asynchronous (No)
	J31	Local commercial power frequency

T0642-2.EPS

[J40: Memo 1] Setting of memo 1

[J41: Memo 2] Setting of memo 2

[J42: Memo 3] Setting of memo 3

These parameters are used with the memo function, and up to 16 characters can be set for each.

[J50: Software Rev No] Display of software revision
This parameter is used to display the software's revision number.

(9) Menu K: Diagnostic Function Setting items

Menu K contains items that are relevant to the diagnosis of insulation adhesion to the electrode.

[K10: Adhesion Check] Setting of adhesion diagnostic function
This parameter selects whether or not the adhesion diagnostic function will be carried out.

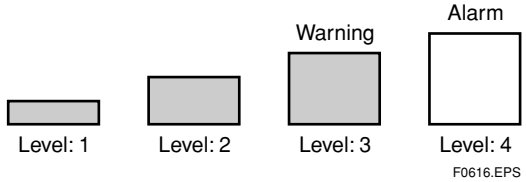
Setting	Function
No	Halt the adhesion diagnostic function
Yes	Carry out the adhesion diagnostic function

T0640.EPS

NOTE

Adhesion Diagnostic Function

- This function diagnose adhesion using electrode resistance values.
- When "Adhesion check" has been set for **B41/H11: Display Select 2** or **B42/H12: Display Select 3**, the diagnose adhesion is indicated on the display unit using four different levels.
- If the judgment value for Level 3 is exceeded, a warning is displayed; and if the value for Level 4 is exceeded, an alarm is displayed.
- Available conductivity for this function is limited to:
  Nominal size 10 mm or smaller: 30 μS/cm
  Nominal size 15 mm or larger: 10 μS/cm
  Make sure to use the adhesion diagnostic function with the greater conductivity than the above mentioned value.



F0616.EPS

[K11: Adhesion Level1] Setting the resistance value for adhesion diagnostic level1
This parameter sets the resistance value (in M ohm) for judgment of Level 1.

[K12: Adhesion Level2] Setting the resistance value for adhesion diagnostic level2
This parameter sets the resistance value (in M ohm) for judgment of Level 2.

[K13: Adhesion Level3] Setting the resistance value for adhesion diagnostic level3
This parameter sets the resistance value (in M ohm) for judgment of Level 3.
*: The warning **80: Adhesion Wng** is displayed when the adhension level reaches Level 3.
*: If "Warning Output" has been selected for **F20: DO Function** or **F21: DIO Function**, then status output will be performed when the adhesion level reaches Level 3.

[K14: Adhesion Level4] Setting the resistance value for adhesion diagnostic level4
This parameter sets the resistance value (in M ohm) for judgment of Level 4.
*: The process alarm **33: Adhesion Alm** is displayed when the adhension level reaches Level 4.
*: Alarm output will be preformed if "Alarm Output" has been selected for **F20: DO Function** or **F21: DIO Function**, and "Yes" for **G34: Alm-Adhesion**.

[K15: Adh Measure Value] Displays the resistance value for adhesion diagnose
This parameter displays the value measured using the adhesion diagnostic function (in M ohm).
When "No" is selected for **K10: Adhesion Check**, this parameter displays the indetermination value.

(10) Menu M: Automatic Zero Adjustment Function Setting items

Menu M contains items that are relevant to automatic adjustment of the zero point.

[M10: Auto Zero Exe] Execution of automatic zero adjustment function
→ Refer to the description of parameter **B50**.

[M11: Magflow Zero] Results of automatic zero adjustment
This parameter is used to display the results obtained from **B50/M10: Auto Zero Exe**. Specifically, the correction value displayed, and it is also possible to directly enter correction value.

(11) Menu N: Loop Test Setting items

Menu N contains items that are relevant to loop testing.

[N10: Test Mode] Setting for loop test execution

Setting	Function
Normal	No execution of loop testing.
Test	Loop testing is started

T0641.EPS

IMPORTANT

(1) Test output has priority over flow rate measurement signals. When carrying out flow rate measurements, be sure to always return to "Normal".
(2) Upon entry to the Test Mode, all output terminals will simultaneously adopt test condition.
(3) "Normal" will be restored when the power is turned off or when 30 minutes have elapsed since entry to Test Mode.
(4) In Test Mode, the warning **83: Fix Cur Wng** will be displayed as a warning message. (For more details, refer to Section 6.5 Alarm Functions.)

[N11: Test Output Value] Setting for test output values

During loop testing, current output (4 to 20mA), totalization, and pulse will be output in accordance with this parameter's setting, and values can be set when "Test" has been selected for **N10: Test Mode**. With multiple ranges or when performing forward/reverse flow measurements, setting should be done using a percentage of the maximum range.

[N30: Test DO] Setting for DO terminal condition during testing

This parameter sets the condition of the DO terminal during loop testing. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Open (Off)	DO terminal in Open (Off) condition
Closed (On)	DO terminal in Closed (On) condition
Pulse	Outputs pulses as were specified with Menu E.*

T0642.EPS

*: If the pulse scale is 0 pps or there is a pulse setting error, the DO terminal is "Open (Off)."

[N31: Test DIO (O)] Setting for the DIO terminal condition during testing

This parameter sets the condition of the DIO terminal during loop testing. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Input mode	Must be set when **N32: Test DIO (I)** is used to display the condition of the DIO terminal.
Open (Off)	DIO terminal in Open (Off) condition
Closed (On)	DIO terminal in Closed (On) condition

T0643.EPS

[N32: Test DIO (I)] Display for DIO terminal condition during testing

This parameter is used to display the condition of the DIO terminal. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Open	DIO terminal in Open condition
Short	DIO terminal in Short condition

T0644.EPS

(12) Menu P: Parameter Protection items

Menu P contains items that are relevant to write protection and passwords.

[P10: Key Code] Parameter of the display restriction

This parameter restricts access to the Service Mode.

NOTE

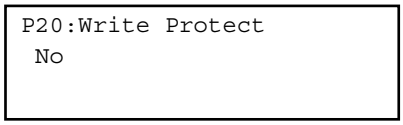
Write Protect function

- The parameters **P20** through **P23** are set when using the write protect function. Specifically, this function responds to a hardware switch or the setting of a software password, and it protects parameters from being overwritten.
- If the hardware switch is set to "Protect", it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to "Enable".
- For more details regarding hardware switch settings, refer to Section 10.2.2: Setting of Write Protect Switch.

[P20: Write Protect] Setting of password to release the write protection function

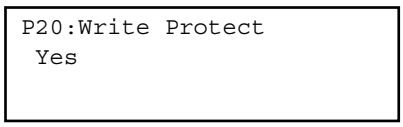
This parameter is used to indicate whether or not write protection is currently on.

Default setting (Enable)



F0617.EPS

Write protection (Protect)



F0618.EPS

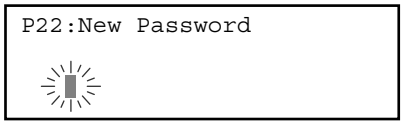
[P21: Enable Wrt Passwd] Setting of password to release the write protection function
When the correct password is input, write protection will be released for a period of 10 minutes; furthermore, this period will be extended by a further 10 minutes each time a parameter is overwritten.

F0619.EPS

The cursor will flash when entering Parameter Replacement Mode, and the password set with **P22: New Password** should be input at this time.

[P22: New Password] Setting of a new password
This parameter sets the password required for the release of write protection. When set, it will be possible to make write protect settings on the software side.

Default setting



F0620.EPS

The default setting for this parameter is a string of 8 spaces (i.e., Enable), and thus, the password field will be empty. When the cursor is flashing, the password should be input. Press the SET key twice to confirm the password. The display will then change to "********".

After password setting

F0621.EPS

To change a password, first of all use the password originally set with **P21: Enable Wrt Passwd** to release the write protect function, and then set the new password. Alternatively, if it is desired to return to the condition where no password is set, enter a string of 8 spaces.

[P23: Software Seal] Display the software seal
When the joker password has been used to release write protection, this parameter displays "Break", and when protection is cancelled using the password set using **P22: New Password**, it returns to "Keep".

NOTE

If you should forget your password, the joker password can be used to temporarily release write protection function. To obtain the joker password, please contact your nearest YOKOGAWA sales office.

6.5 Alarm Functions

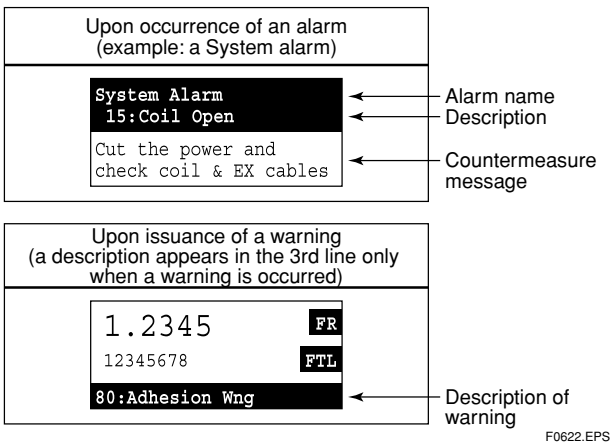
6.5.1 Alarm Levels

Alarms are classified into the following four different types based on level.

Alarm	Level	Description
System alarm	Major breakdown	Device breakdown or inability to obtain correct measurements. Replacement will be required.
Process alarm	Intermediate level break down	Device is normal but process-related errors make correct measurement impossible. Maintenance or the like will be required.
Setting alarm	Minor breakdown	Device is normal but errors have been made in the setting of parameters. Functions not related to the incorrect settings are operating normally. The incorrect settings must be corrected.
Warning	Warning	Device and measurements are normal but a warning is occurred.

T0645.EPS

When an alarm has been occurred, the corresponding alarm name, description, and suitable countermeasure will be displayed on the display unit. The normal Display Mode and Alarm Mode may be displayed alternatively. When a warning has been issued, the corresponding content will be shown in the third line in the Display Mode.



F0622.EPS

6.5.2 Alarm Selection

The display and output differs depending on the alarm levels. Certain types of alarm may or may not be recognized as alarms, according to the settings of certain parameters. The parameters that are relevant to this function as follows.

[F20: DO Function] Setting of the function for the DO status output terminal

[F21: DIO Function] Setting of the function for the DIO status input/output terminal

[F22: DO Active Mode] Setting of the active mode for DO terminal

[F23: DIO Active Mode] Setting of the active mode for DIO terminal

[G21: 4-20mA Alarm Out] Setting of the current output during an alarm occurring.

[G30: Alm-Setting] Alarm recognition of "Setting Alarm"

[G31: Alm-Sig Over] Alarm recognition of "Signal Overflow Alarm"

[G32: Alm-Emp Pipe] Alarm recognition of "Empty Pipe alarm"

[G33: Alm-HH/LL] Alarm recognition of "HH/LL Alarm" (Refer to the descriptions of **G12** and **G13** for more details regarding HH and LL alarms.)

[G34: Alm-Adhesion] Alarm recognition of "Adhesion Alarm"

[G41: Alm Record1] Alarm record1

[G43: Alm Record2] Alarm record2

[G45: Alm Record3] Alarm record3

[G47: Alm Record4] Alarm record4

(1) Display and output condition for system alarms

		Alarm description	Alarm output	4-20 mA output	Totalization	Pulse	Display unit	Alarm record
	Normal		Closed (On)	Normal	Normal	Normal	Display Mode	No
10	μP Fault	Microprocessor(CPU)failure	Open (Off)	0mA or 25mA (*)	Indetermination	Stopped	Indetermination	Indetermination
11	EEPROM Fault	EEPROM failure						
12	A/D(H) Fault	A/D converter failure	Open (Off)	Fixed (G21 selection)	Stopped	Stopped	Alarm Mode (display of system alarm message)	Recorded
13	A/D(L) Fault							
14	A/D(Z) Fault							
15	Coil Open	Flowtube coil is open-circuit						
16	EEPROM Dflt	EEPROM default values						

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode**, or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.
*The output value is performed in accordance with the setting of the burnout switch. For information about this switch, see Section 10.2.1.

T0646.EPS

(2) Display and output condition for process alarms

		Alarm description	Selection (parameter number)	Alarm output	4-20 mA output	Totalization	Pulse output	Display unit	Alarm record
30	Sig Overflow	Input signal error	YES (G31)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G31)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No
31	Empty Pipe	Flowtube is not filled with fluid	YES (G32)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G32)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No
32	HH/LL Alm	HH/LL Alarm	YES (G33)	Open (Off)	Normal operation	Normal operation	Normal operation	Alarm Mode (Message)	No
			NO (G33)	Closed (On)				Display Mode	
33	Adhesion Alm	Electrode adhesion alarm	YES (G34)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G34)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode** or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.
*: Although outputs are continuous, output values are not guaranteed.

T0647.EPS

(3) Display and output condition for setting alarm occurrences

		Alarm description	Selection (parameter number)	Alarm output	4-20 mA output	Totali-zation	Pulse output	Display unit	Alarm record
50	Span > 10m/s	Span flow velocity setting is 11 m/s or more	NO (G30)	Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
51	Span < 0.1m/s	Span flow velocity setting is 0.05 m/s or less							
52	TTL>10000p/s	Totalization rate is 11000 pps or more		Closed (On)	Normal operation	Stopped	Normal operation	Alarm Mode (message)	No
53	TTL<0.0001p/s	Totalization rate is 0.00005 pps or less							
54	4-20 Lmt Err	The condition [4-20 low limit (J11) < 4-20 high limit (J12)] is not satisfied.		Closed (On)	Fixed	Normal operation	Normal operation	Alarm Mode (message)	No
55	Multi Rng Err	The condition [No. 1 range < No. 2 range < No. 3 range < No. 4 range] is not satisfied for multiple ranges.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
56	H/L HH/LL Set	The condition [High Alarm (G11) – Low Alarm (G10) > H/L Alarm Hys (G14)] or the condition [High High Alarm (G13) – Low Low Alarm (G12) > H/L Alarm Hys (G14)] is not satisfied.		Closed (On)	Normal operation	Normal operation	Normal operation	Alarm Mode (message)	No
57	Dens Set Err	Mass units have been selected for Base Flow Unit (C40) but density is set to 0.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
60	PLS >10000p/s	Pulse rate is 11000 pps or more with 50% duty selection.		Closed (On)	Normal operation	Normal operation	Stopped	Alarm Mode (message)	No
		Pulse rate is 10000 pps or more with 0.05 ms selection.							
61	PLS > 5000p/s	Pulse rate is 5000 pps or more with 0.1 ms selection.							
62	PLS > 1000p/s	Pulse rate is 1000 pps or more with 0.5 ms selection.							
63	PLS > 500p/s	Pulse rate is 500 pps or more with 1 ms selection.							
64	PLS > 25p/s	Pulse rate is 25 pps or more with 20 ms selection.							
65	PLS > 15p/s	Pulse rate is 15 pps or more with 33 ms selection.							
66	PLS > 10p/s	Pulse rate is 10 pps or more with 50 ms selection.							
67	PLS > 5p/s	Pulse rate is 5 pps or more with 100 ms selection.							
70	PLS<0.0001p/s	Pulse rate is 0.00005 pps or less.							
71	Meas Mod Set	Measure Mode (C20) is set to Enhanced DF without selecting an optional code HF1 or HF2.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
72	Size Set Err	A value of 3000.1 mm or more is set for Nominal Size (C32).		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
73	Adh Set Err	The condition [Level:1< Level:2<Level:3<Level:4] is not satisfied for adhesion diagnostic level.		Closed (On)	Normal operation	Normal operation	Normal operation	Alarm Mode (message)	No
	Occurring of any alarm from 50 through 73	–	YES (G30)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (message)	No

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode** or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.

T0648.EPS

6.5.3 Alarms & Warning Messages

System Alarms (Device breakdown or inability to obtain correct measurements.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
10:uP Fault	Contact nearest office or service center	Microprocessor (CPU) failure	Contact your nearest Yokogawa office or service center.
11:EEPROM Fault	Contact nearest office or service center	EEPROM failure	
12:A/D(H) Fault	Contact nearest office or service center	A/D converter failure	
13:A/D(L) Fault	Contact nearest office or service center		
14:A/D(Z) Fault	Contact nearest office or service center		
15:Coil Open	Cut the power and check coil & EX cable	Flowtube coil is open-circuit	Turn off the AXFA14 power supply and examine the excitation cable for breakage. If there is no breakage, contact your nearest Yokogawa office or service center. In case of the AXF integral flowmeter, the excitation cable cannot be examined. Contact your nearest Yokogawa office or service center.
16:EEPROM Dflt	Contact nearest office or service center	EEPROM default values	Contact your nearest Yokogawa office or service center.

T0649.EPS

Process Alarms (Device is normal but process-related errors make correct measurement impossible.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
30:Sig Overflow	Check signal cable and grounding	Input signal error	Carry out an investigation as follows: • Check the signal cable for breakage. • Check for contact between signal cable, power cable, and excitation cable. • Check for stray currents in the fluid. • Check the grounding.
31:Empty Pipe	Fill flow tube with fluid	Flowtube is not filled with fluid	Fill the flowtube with fluid.
32:HH/LL Alm	Check the flow rate and setting value	Flow rate alarm for greater than High-High limit value or less than Low-Low limit value.	Check the flow rate and setting value of High High limit and Low Low limit.
33:Adhesion Alm	Clean electrodes	Electrode adhesion alarm	Clean the electrodes.

T0650.EPS

Setting Alarms (Device is normal but errors have been made in the setting of parameters.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
50:Span > 10m/s	Check parameter C40, C41, and C42	Span flow velocity setting is 11 m/s or more	Check whether parameters C40, C41, and C42 are correct. In case that multiple range or forward and reverse flow measurement functions is used, check whether parameters F30 through F34 are correct.
51:Span < 0.1m/s	Check parameter C40, C41, and C42	Span flow velocity setting is 0.05 m/s or less	
52:TTL>10000p/s	Check parameter D10 and D11	Totalization rate is 11000 pps or more	Check whether parameters D10 and D11 are correct.
53:TTL<0.0001p/s	Check parameter D10 and D11	Totalization rate is 0.00005 pps or less	
54:4-20 Lmt Err	Check parameter J11and J12	The condition [4-20 low limit (J11) < 4-20 high limit (J12)] is not satisfied.	Check whether parameters J11 and J12 are correct.
55:Multi Rng Err	Check parameter F30 to F34	The condition [No. 1 range < No. 2 range < No. 3 range < No. 4 range] is not satisfied for multiple ranges.	Check whether parameters F30 through F34 are correct.
56:H/L HH/LL Set	Check parameter G10 to G14	The condition [High Alarm (G11) – Low Alarm (G10) > H/L Alarm Hys (G14)] or the condition [High High Alarm (G13) – Low Low Alarm (G12) > H/L Alarm Hys (G14)] is not satisfied.	Check whether parameters G10 through G14 are correct.
57:Dens Set Err	Check parameter C40, C45, and C46	Mass units have been selected for Base Flow Unit (C40) but density is set to 0.	Check whether parameters C40, C45, and C46 are correct.
60:PLS > 10000p/s	Check parameter E10, E11, and E12	Pulse rate is 11000 pps or more with 50% duty selection. Pulse rate is 10000 pps or more with 0.05 ms selection.	Check whether parameters E10, E11, and E12 are correct.
61:PLS > 5000p/s	Check parameter E10, E11, and E12	Pulse rate is 5000 pps or more with 0.1 ms selection.	
62:PLS > 1000p/s	Check parameter E10, E11, and E12	Pulse rate is 1000 pps or more with 0.5 ms selection.	
63:PLS > 500p/s	Check parameter E10, E11, and E12	Pulse rate is 500 pps or more with 1 ms selection.	
64:PLS > 25p/s	Check parameter E10, E11, and E12	Pulse rate is 25 pps or more with 20 ms selection.	
65:PLS > 15p/s	Check parameter E10, E11, and E12	Pulse rate is 15 pps or more with 33 ms selection.	
66:PLS > 10p/s	Check parameter E10, E11, and E12	Pulse rate is 10 pps or more with 50 ms selection.	
67:PLS > 5p/s	Check parameter E10, E11, and E12	Pulse rate is 5 pps or more with 100 ms selection.	
70:PLS<0.0001p/s	Check parameter E10, E11, and E12	Pulse rate is 0.00005 pps or less.	
71:Meas Mod Set	Check parameter C20	Measure Mode (C20) is set to Enhanced DF without selecting an optional code HF1 or HF2.	Check whether parameter C20 is correct.
72: Size Set Err	Check parameter C32	A value of 3000.1 mm or more is set for Nominal Size (C32).	Check whether parameter C32 is correct.
73: Adh Set Err	Check parameter K11 to K14	The condition in Adhesion detection level, Level:1<Level:2<Level:3<Level:4 is not satisfied.	Check whether parameters K11, K12, K13 and K14 are correct.

T0651.EPS

Setting Alarms (Device and measurements are normal but a warning is issued.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
80:Adhesion Wng	–	Slight adhesion to electrodes.	Clean and check the electrodes. Refer to parameter K13.
82:Auto Zero Wng	–	Results of automatic zero adjustment are higher than the rated values.	Carry out adjustment as follows: • Check if the flowtube is filled with fluid. • Check if the flow velocity is completely zero. • Check the condition of grounding.
83:Fix Cur Wng	–	The current value is fixed.	Confirm whether the flow rate is in excess of the upper limit (108%) or below the lower limit (-8%), or whether upon entry to the Test Mode or not.
84:Disp Over Wng (only for display unit)	–	Overflow in the display digits during instantaneous flow rate display.	Check whether parameter C43 is correct.
90:Disp SW Wng (only for display unit)	–	Display unit switches are not operating.	Investigate whether the display unit cover is fitted or whether the cover's glass surface is dirty.

T0652.EPS

6.6 Precautions for the AXF Integral Flowmeter

Although the AXF integral flowmeter's software configurations are the same as the AXFA14, care must be taken in setting the following parameters:

[C31: Nominal Size Unit] Setting of the nominal size units
[C32: Nominal Size] Setting of the nominal size

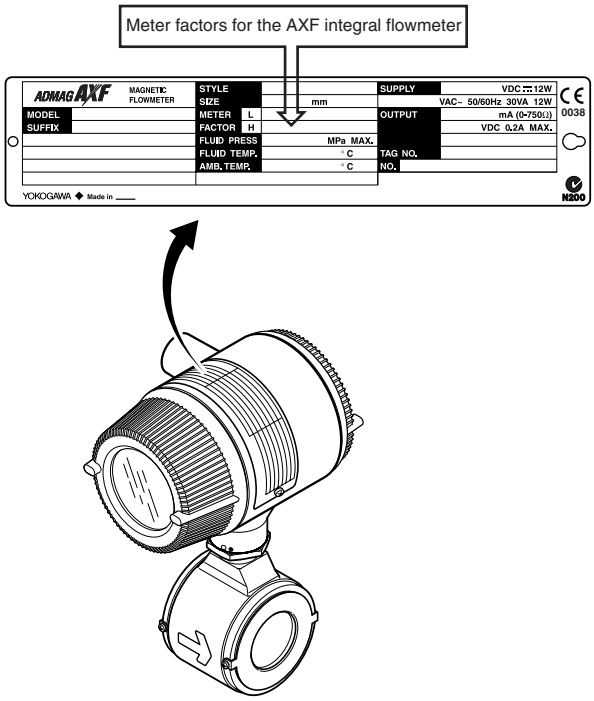
NOTE

The nominal size unit, nominal size and meter factor have been properly set upon shipment from the manufacturing plant. Do not change these parameters.

[C21: Low MF] Setting of the low-frequency meter factor
[C22: High MF] Setting of the high-frequency meter factor
[C23: Low MF (EDF)] Setting of the low-frequency meter factor for enhanced DF (i.e., enhanced dual frequency excitation)
[C24: High MF (EDF)] Setting of the high-frequency meter factor for enhanced DF (i.e., enhanced dual frequency excitation)

NOTE

Setting the meter factor



F0623.EPS

(1) Confirm that the meter factors indicated on your AXF integral flowmeter's data plate has been set to the parameters.
(2) The meter factors are crucial in ensuring that the electromotive force is correctly in proportion to the flow velocity and are determined at the manufacturing plant by actual-flow calibration.

NOTE

For the hardware configuration of the AXF integral flowmeter, see the user's manual of the AXF Integral Flowmeter [Hardware Edition] (IM 01E20D01-01E).

7. OPERATION VIA BRAIN TERMINAL (BT200)

NOTE

This chapter describes the AXFA14 converter as an example. The same attention must be paid to the AXF integral flowmeter.

7.1 BT200 Basic Operations

7.1.1 Key Layout and Display

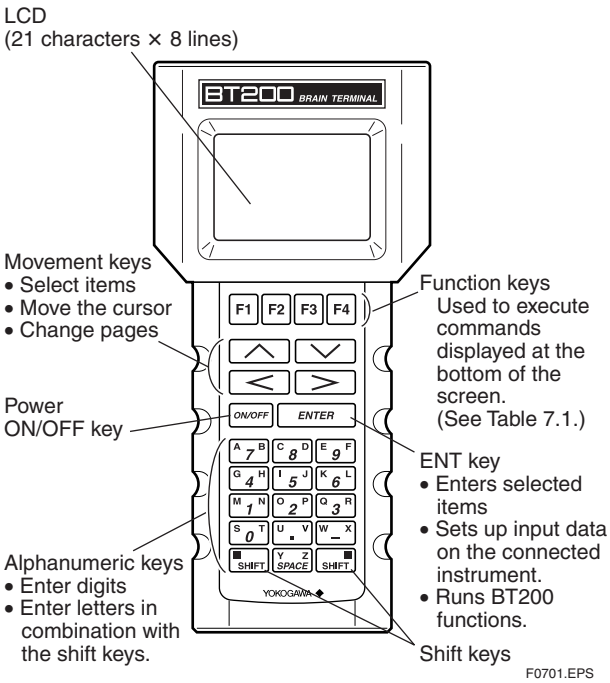
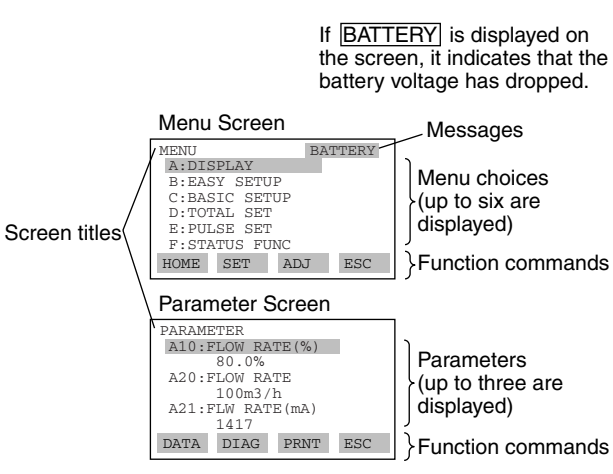


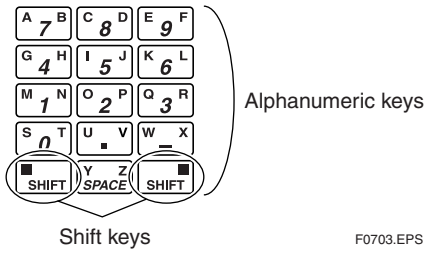
Figure 7.1 Key Layout



7.1.2 Key Descriptions

(1) Alphanumeric keys and shift keys

You can use the alphanumeric keys in conjunction with the shift keys to enter letters, digits, and symbols.



a) Entering digits, symbols, and spaces [i.e., 0-9, period (.), hyphen (-), underscore (_)]

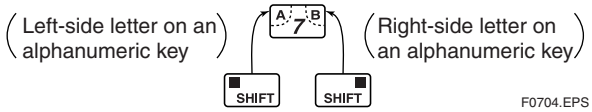
Simply press the required alphanumeric key.

Entry	Key-in sequence
–4	W _ X, G 4 H
0.3	S 0 T, U . V, Q 3 R
1 ␣ –9	M 1 N, Y Z SPACE, W _ X, E 9 F

T0701.EPS

b) Entering letters (i.e., A through Z)

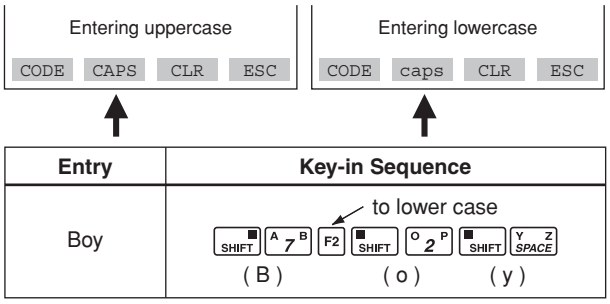
Press an alphanumeric key following a shift key to enter the letter shown on the same side as the shift key. The shift key must be pressed for each letter being input.



Entry	Key-in sequence
W	SHIFT, W _ X
IC	SHIFT, I 5 J, SHIFT, C 8 D
J. B	SHIFT, I 5 J, U . V, SHIFT, A 7 B

T0702.EPS

Use the function key [F2] CAPS to select between uppercase and lowercase (for letters only). The case toggles between uppercase and lowercase each time you press [F2] CAPS.

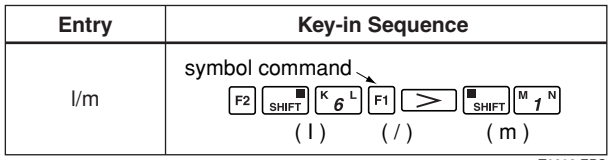

Entering uppercase
CODE CAPS CLR ESC
Entering lowercase
CODE caps CLR ESC
Entry
Key-in Sequence
Boy
to lower case
SHIFT A 7 B F2 SHIFT O 2 P SHIFT Y Z SPACE
(B) (o) (y)

F0807.EPS

Use the function key [F1] CODE to enter symbols. The following symbols will appear in sequence, one at a time, at the cursor each time you press [F1] CODE:

/ . – , + *) (’ & % $ # ” !

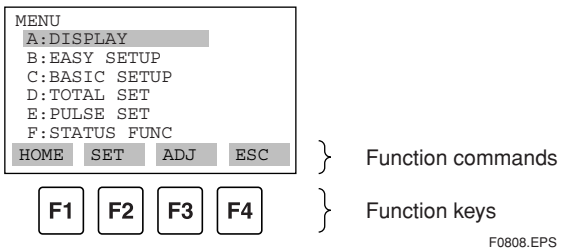
To enter characters next to these symbols, press [>] to move the cursor.



T0803.EPS

(2) Function Keys

The functions of the function keys depend on the function commands on display.



F0808.EPS

Function Command List

Command	Function
ADJ	Displays the ADJ menu
CAPS/caps	Selects uppercase or lowercase
CODE	Selects symbols
CLR	Erases input data or deletes all data
DATA	Updates parameter data
DEL	Deletes one character
DIAG	Calls the self-check panel
ESC	Returns to the most recent display
HOME	Displays the menu panel
NO	Quits setup and returns to the previous display
OK	Proceeds to the next panel
PARM	Enters the parameter number setup mode
SET	Displays the SET menu
SLOT	Returns to the slot selection panel
UTIL	Calls the utility panel
*COPY	Prints out parameters on display
*FEED	Paper feed
*LIST	Lists all parameters in the menu
*PON/POFF	Automatic printout mode on or off
*PRNT	Changes to the print mode
*GO	Starts printing
*STOP	Cancels printing

* Available on BT200-P00 (with printer).

T0804.EPS

7.2 AXFA14 Operation Using a BT200

This section describes procedures for setting parameters using a BRAIN Terminal (BT200). For more details regarding AXFA14 functions, refer to Chapter 6: Parameter Description; and for more details regarding BT200 operation methods, refer to the BT200 User's Manual (IM 01C00A11-01E).

7.2.1 BT200 Connection

Connection to a 4 to 20 mA DC signal line

The communication signal is superimposed onto the 4 to 20 mA DC analog signals to be transmitted.

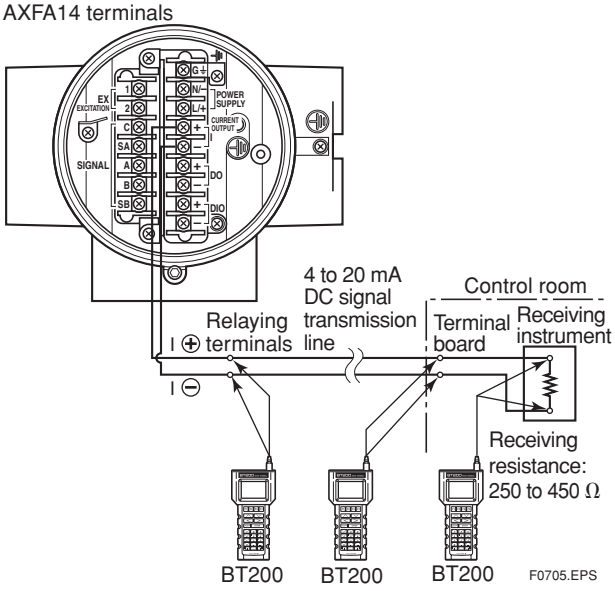


Figure 7.2 Connecting the BT200

WARNING

Be sure to set parameters as "Protect" on the write protect function after finish of parameter setting work.
Under extremely rare case, the infra-red switches may respond unexpectedly in such conditions as sticking ball of water or extraneous substances on the surface of display panel glass according to the principle of infra-red switch operation.
Its probability rises in such cases as sticking rain water by storm or other similar situation and washing up work near flowmeter installation place.
Either to illuminate or stop illuminating the infra-red switches by the flashlight may cause the mis-reaction.

Refer to Chapter 6 "Menu P: Parameter Protection Items" and section "10.2.2" how to use the write protect function in detail.

IMPORTANT

Restrictions exist with regard to the distance over which communication is possible. (See Chapter 11: Outline.)

IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

IMPORTANT

After approximately 5 minutes of inactivity, the Auto Power-Off function will operate to turn your BT200 off.

NOTE

In case of BT200, the parameters are displayed in English only.
Even if the language with the exception of English is selected at **B10/H30: Language**, the parameters are displayed in English upon BT200.

7.2.2 The data update and upload/ download function of BT200

(1) The data update of BT200

When the following parameters are displayed, the measured data is updated automatically every seven seconds.

Item	Name (BRAIN)	Item	Name (BRAIN)
A10	FLOW RATE (%)	G42	ALM TIME 1
A20	FLOW RATE	G43	ALM RECORD2
A21	FLW RATE (mA)	G44	ALM TIME 2
A30	TOTAL	G45	ALM RECORD3
A31	REV TOTAL	G46	ALM TIME 3
A32	DIF TOTAL	G47	ALM RECORD4
C44	VELOCITY CHK	G48	ALM TIME 4
G22	4-20 BURNOUT	N32	TEST DIO (I)
G40	OPERATE TIME	P20	W PROTECT
G41	ALM RECORD1	P23	SOFT SEAL

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(2) Upload/download function of BT200

Upload function is used when the parameters of one AXFA14 are copied to the BT200. And download function is used when the parameters copied to the BT200 are set to another AXFA14.
For details, refer to BT200 User's Manual (IM 01C00A11-01E).
The targeted parameters for upload and download are following.

Item	Name (BRAIN)	Item	Name (BRAIN)
C11/B20	FLOW DAMPING	D10/B30	TOTAL UNIT
C31	SIZE UNIT	D11/B31	TOTAL SCALE
C32	NOMINAL SIZE	E10/B32	PULSE UNIT
C40/B21	FLOW UNIT	E11/B33	PULSE SCALE
C41/B22	TIME UNIT	H10/B40	DISP SELECT1
C42/B23	FLOW SPAN	H11/B41	DISP SELECT2
C43/B24	FLOW DECIMAL	H12/B42	DISP SELECT3

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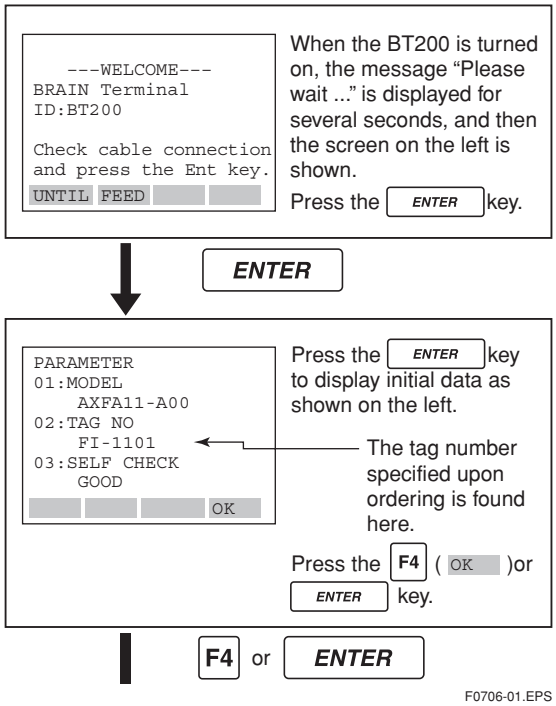
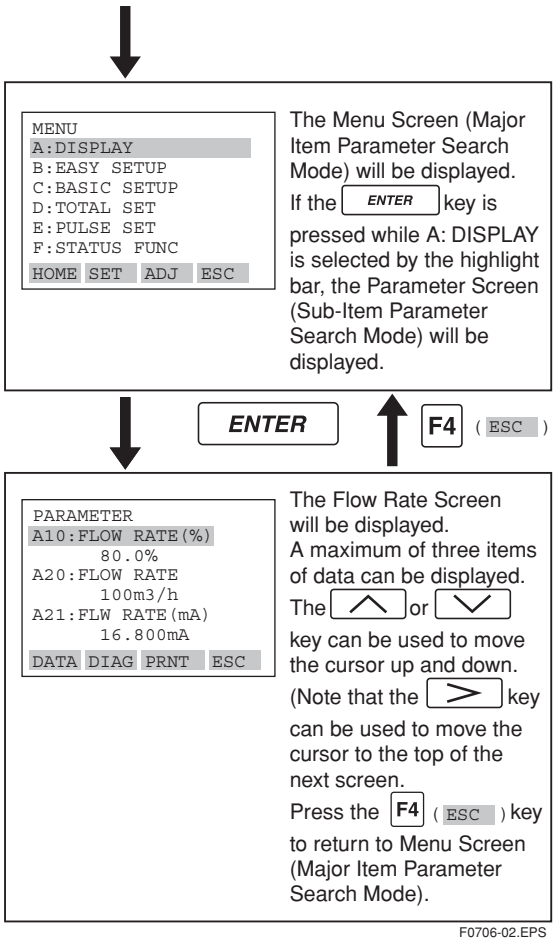
7.2.3 BT200 Screens & Flow Rate Data Display

Use the following procedure to display flow rate data on the BT200.

• The display of flow rate data is updated every 5 seconds.


---WELCOME---
BRAIN Terminal
ID:BT200
Check cable connection
and press the Ent key.
UNTIL FEED
When the BT200 is turned on, the message "Please wait ..." is displayed for several seconds, and then the screen on the left is shown.
Press the ENTER key.
ENTER
PARAMETER
01:MODEL
AXFA11-A00
02:TAG NO
FI-1101
03:SELF CHECK
GOOD
OK
Press the ENTER key to display initial data as shown on the left.
The tag number specified upon ordering is found here.
Press the F4 (OK)or ENTER key.
F4 or ENTER

F0706-01.EPS


MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
The Menu Screen (Major Item Parameter Search Mode) will be displayed.
If the ENTER key is pressed while A: DISPLAY is selected by the highlight bar, the Parameter Screen (Sub-Item Parameter Search Mode) will be displayed.
ENTER
F4 (ESC)
PARAMETER
A10:FLOW RATE(%)
80.0%
A20:FLOW RATE
100m3/h
A21:FLW RATE(mA)
16.800mA
DATA DIAG PRNT ESC
The Flow Rate Screen will be displayed.
A maximum of three items of data can be displayed.
The or key can be used to move the cursor up and down.
(Note that the key can be used to move the cursor to the top of the next screen.
Press the F4 (ESC) key to return to Menu Screen (Major Item Parameter Search Mode).

F0706-02.EPS

7.3 Parameter Setting Using a BT200

This section describes the procedure for setting of parametes using a BT200.

IMPORTANT

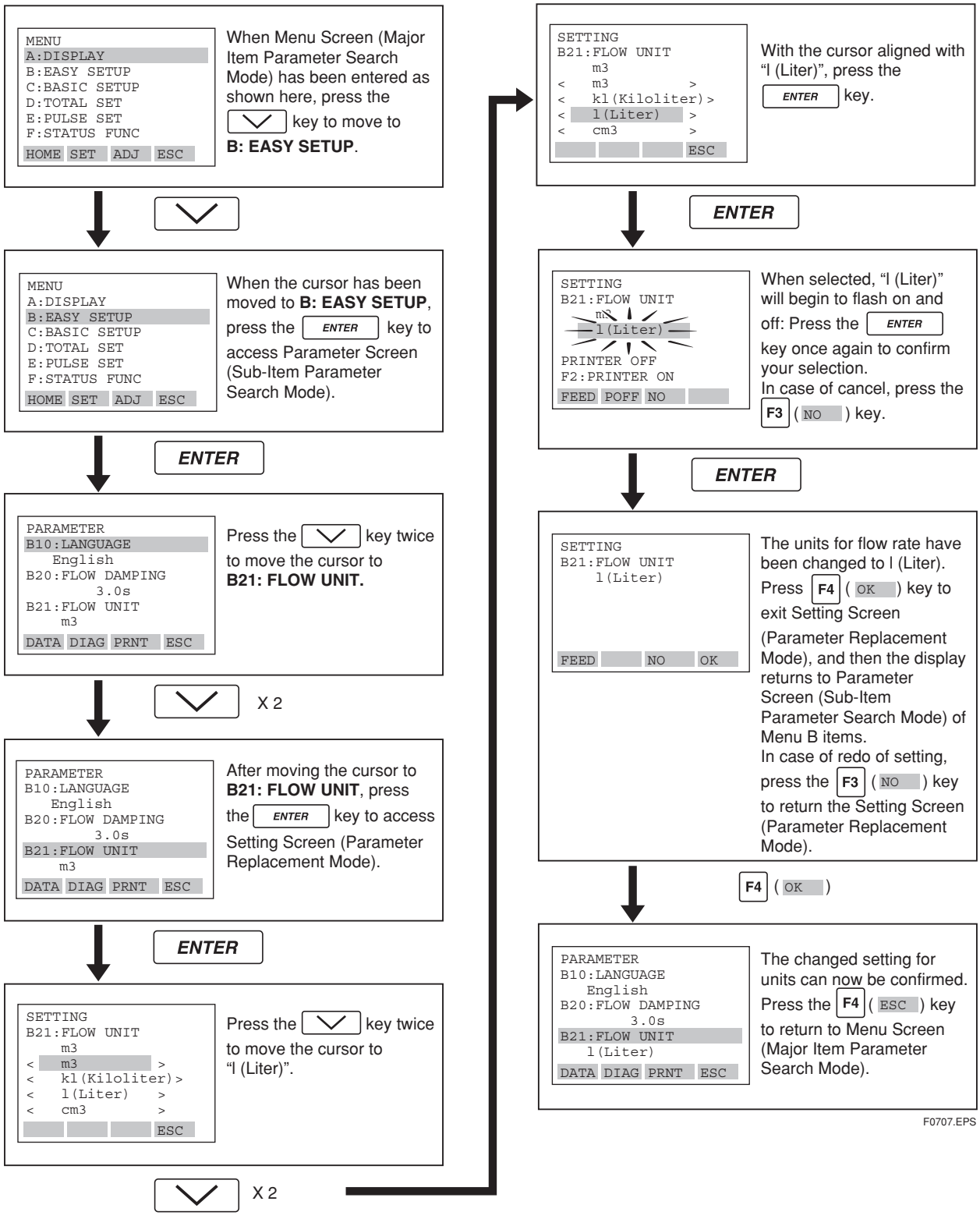
If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

NOTE

Before updating any setting, remember to always check the data content you want to change as described in Chapter 6: Parameter Description.

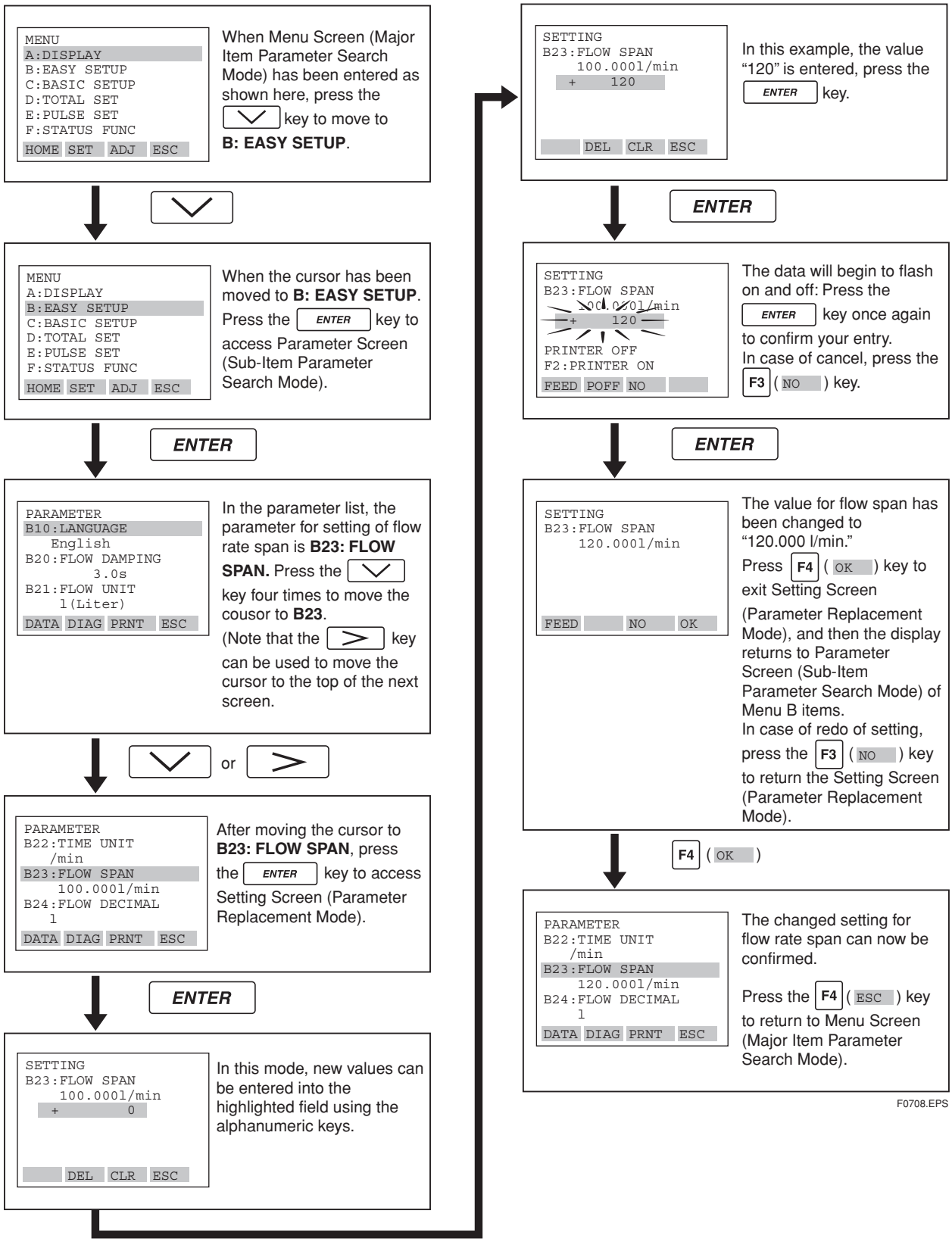
7.3.1 BT200 Setting of Selection-Type Data: Flow rate units

In this example, the flow rate units specified by the selection-type parameter **B21: Flow Unit** are changed from m^3 to l (Liter).


MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
When Menu Screen (Major Item Parameter Search Mode) has been entered as shown here, press the key to move to B: EASY SETUP.
MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
When the cursor has been moved to B: EASY SETUP, press the ENTER key to access Parameter Screen (Sub-Item Parameter Search Mode).
ENTER
PARAMETER
B10:LANGUAGE
English
B20:FLOW DAMPING
3.0s
B21:FLOW UNIT
m3
DATA DIAG PRNT ESC
Press the key twice to move the cursor to B21: FLOW UNIT.
X 2
PARAMETER
B10:LANGUAGE
English
B20:FLOW DAMPING
3.0s
B21:FLOW UNIT
m3
DATA DIAG PRNT ESC
After moving the cursor to B21: FLOW UNIT, press the ENTER key to access Setting Screen (Parameter Replacement Mode).
ENTER
SETTING
B21:FLOW UNIT
m3
< m3 >
< kl(Kiloliter) >
< l(Liter) >
< cm3 >
ESC
Press the key twice to move the cursor to "l (Liter)".
X 2
SETTING
B21:FLOW UNIT
m3
< m3 >
< kl(Kiloliter) >
< l(Liter) >
< cm3 >
ESC
With the cursor aligned with "l (Liter)", press the ENTER key.
ENTER
SETTING
B21:FLOW UNIT
m3
l(Liter)
PRINTER OFF
F2:PRINTER ON
FEED POFF NO
When selected, "l (Liter)" will begin to flash on and off: Press the ENTER key once again to confirm your selection.
In case of cancel, press the F3 (NO) key.
ENTER
SETTING
B21:FLOW UNIT
l(Liter)
FEED NO OK
The units for flow rate have been changed to l (Liter).
Press F4 (OK) key to exit Setting Screen (Parameter Replacement Mode), and then the display returns to Parameter Screen (Sub-Item Parameter Search Mode) of Menu B items.
In case of redo of setting, press the F3 (NO) key to return the Setting Screen (Parameter Replacement Mode).
F4 (OK)
PARAMETER
B10:LANGUAGE
English
B20:FLOW DAMPING
3.0s
B21:FLOW UNIT
l(Liter)
DATA DIAG PRNT ESC
The changed setting for units can now be confirmed.
Press the F4 (ESC) key to return to Menu Screen (Major Item Parameter Search Mode).
F0707.EPS

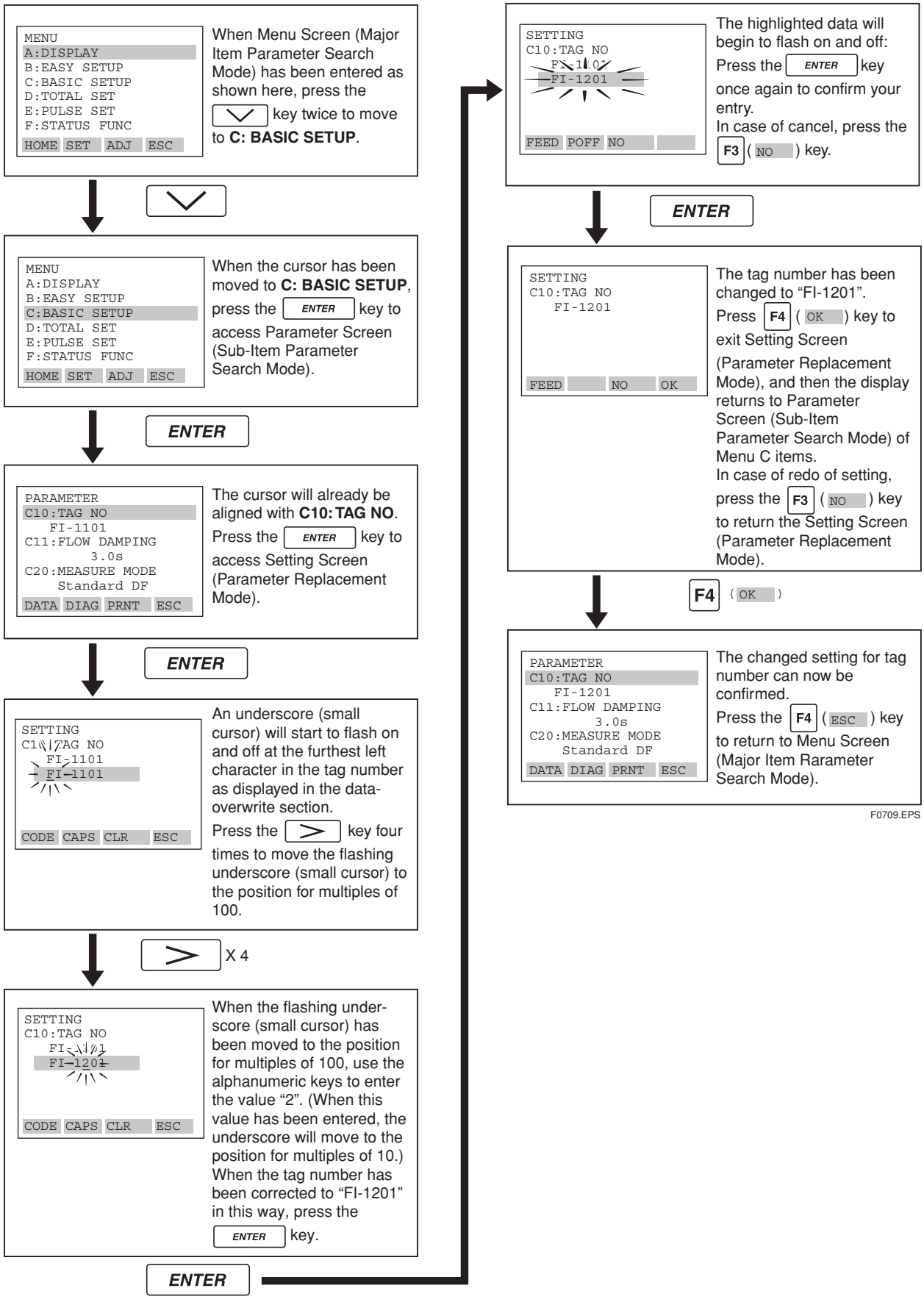
7.3.2 BT200 Setting of Numeric-Type Data: Flow rate span

In this example, the flow rate span specified by the numeric-type parameter **B23: Flow Span** is changed from 100.000 l/min. to 120.000 l/m.


MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
When Menu Screen (Major Item Parameter Search Mode) has been entered as shown here, press the key to move to B: EASY SETUP.
MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
When the cursor has been moved to B: EASY SETUP. Press the ENTER key to access Parameter Screen (Sub-Item Parameter Search Mode).
ENTER
PARAMETER
B10:LANGUAGE
English
B20:FLOW DAMPING
3.0s
B21:FLOW UNIT
l(Liter)
DATA DIAG PRNT ESC
In the parameter list, the parameter for setting of flow rate span is B23: FLOW SPAN. Press the key four times to move the cousor to B23. (Note that the key can be used to move the cursor to the top of the next screen.
or
PARAMETER
B22:TIME UNIT
/min
B23:FLOW SPAN
100.000l/min
B24:FLOW DECIMAL
l
DATA DIAG PRNT ESC
After moving the cursor to B23: FLOW SPAN, press the ENTER key to access Setting Screen (Parameter Replacement Mode).
ENTER
SETTING
B23:FLOW SPAN
100.000l/min
+ 0
DEL CLR ESC
In this mode, new values can be entered into the highlighted field using the alphanumeric keys.
SETTING
B23:FLOW SPAN
100.000l/min
+ 120
DEL CLR ESC
In this example, the value "120" is entered, press the ENTER key.
ENTER
SETTING
B23:FLOW SPAN
100.000l/min
+ 120
PRINTER OFF
F2:PRINTER ON
FEED POFF NO
The data will begin to flash on and off: Press the ENTER key once again to confirm your entry. In case of cancel, press the F3 (NO) key.
ENTER
SETTING
B23:FLOW SPAN
120.000l/min
FEED NO OK
The value for flow span has been changed to "120.000 l/min." Press F4 (OK) key to exit Setting Screen (Parameter Replacement Mode), and then the display returns to Parameter Screen (Sub-Item Parameter Search Mode) of Menu B items. In case of redo of setting, press the F3 (NO) key to return the Setting Screen (Parameter Replacement Mode).
F4 (OK)
PARAMETER
B22:TIME UNIT
/min
B23:FLOW SPAN
120.000l/min
B24:FLOW DECIMAL
l
DATA DIAG PRNT ESC
The changed setting for flow rate span can now be confirmed. Press the F4 (ESC) key to return to Menu Screen (Major Item Parameter Search Mode).
F0708.EPS

7.3.3 BT200 Setting of Alphanumeric-Type Data: Tag number

In this example, the tag number specified by the alphanumeric-type parameter **C10: TAG NO** is changed from "FI-1101" to "FI-1201".


MENU
A:DISPLAY
B:EASY SETUP
C:BASIC SETUP
D:TOTAL SET
E:PULSE SET
F:STATUS FUNC
HOME SET ADJ ESC
When Menu Screen (Major Item Parameter Search Mode) has been entered as shown here, press the key twice to move to C: BASIC SETUP.
When the cursor has been moved to C: BASIC SETUP, press the ENTER key to access Parameter Screen (Sub-Item Parameter Search Mode).
ENTER
PARAMETER
C10:TAG NO
FI-1101
C11:FLOW DAMPING
3.0s
C20:MEASURE MODE
Standard DF
DATA DIAG PRNT ESC
The cursor will already be aligned with C10: TAG NO. Press the ENTER key to access Setting Screen (Parameter Replacement Mode).
ENTER
SETTING
C10:TAG NO
FI-1101
FI-1101
CODE CAPS CLR ESC
An underscore (small cursor) will start to flash on and off at the furthest left character in the tag number as displayed in the data-overwrite section.
Press the key four times to move the flashing underscore (small cursor) to the position for multiples of 100.
X 4
SETTING
C10:TAG NO
FI-1201
CODE CAPS CLR ESC
When the flashing underscore (small cursor) has been moved to the position for multiples of 100, use the alphanumeric keys to enter the value "2". (When this value has been entered, the underscore will move to the position for multiples of 10.) When the tag number has been corrected to "FI-1201" in this way, press the ENTER key.
ENTER
SETTING
C10:TAG NO
FI-1201
FEED POFF NO
The highlighted data will begin to flash on and off: Press the ENTER key once again to confirm your entry.
In case of cancel, press the F3 (NO) key.
ENTER
SETTING
C10:TAG NO
FI-1201
FEED NO OK
The tag number has been changed to "FI-1201".
Press F4 (OK) key to exit Setting Screen (Parameter Replacement Mode), and then the display returns to Parameter Screen (Sub-Item Parameter Search Mode) of Menu C items.
In case of redo of setting, press the F3 (NO) key to return the Setting Screen (Parameter Replacement Mode).
F4 (OK)
PARAMETER
C10:TAG NO
FI-1201
C11:FLOW DAMPING
3.0s
C20:MEASURE MODE
Standard DF
DATA DIAG PRNT ESC
The changed setting for tag number can now be confirmed.
Press the F4 (ESC) key to return to Menu Screen (Major Item Rarameter Search Mode).

F0709.EPS

8. OPERATION VIA HART COMMUNICATOR

NOTE

This chapter describes the AXFA14 as an example.

Note: HART is a registered trademark of the HART Communication Foundation.

8.1 Matching of instrument (AXFA14) DD and HART Configuration Tool's DD

Before using the HART Configuration Tool (such as FieldMate), confirm that the DD (Device Description) of the AXFA14 is installed in the Configuration Tool before using.
About the DD, use the device type, device revision and DD Revision shown in follows.

Model Name	DTM Name	Device Type	Device Revision
AXFA14	AXFA14 V1.1	AXFA14 (0x0052)	2

T0801.EPS

The DD revisions for AXFA14 and Configuration Tool's can confirm in accordance with the following steps.
If the correct DD is not installed in the HART Configuration Tool, download them from the official HART programming sites, otherwise, contact the respective vendors of the Configuration Tool for its upgrade information.

1. Confirmation of the device revision for AXFA14

   (1) Connect the Configuration Tool to the AXFA14. The device revision can be checked as follows.

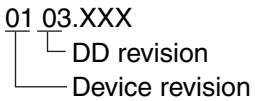
DD	Device Setup → Review → Review4 → Fld dev rev
DTM	Configuration → HART → Fld dev rev

T0802.EPS

2. Confirmation of the device revision for the HART Configuration Tool

   (1) Turn on the power of the Configuration Tool under the standalone condition.

   (2) Confirm the installed DD revision in accordance with the procedure of the Configuration Tool. Refer to its manual how to confirm it in detail.
   The first 2 digits of the DD file are expressed the device revision, and its last 2 digits are expressed the DD revision.



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8.2 Interconnection between AXFA14 and HART Configuration Tool

The HART Configuration Tool can interface with the AXFA14 from the control room, the AXFA14 site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 250 V between the connection and the receiving instrument. To communicate, it must be connected in parallel with the AXFA14, and the connections must be non-polarized. Figure 8.2.1 illustrates the wiring connections for a direct interface at the AXFA14 site. The HART Configuration Tool can be used for remote access from any terminal strip as well.

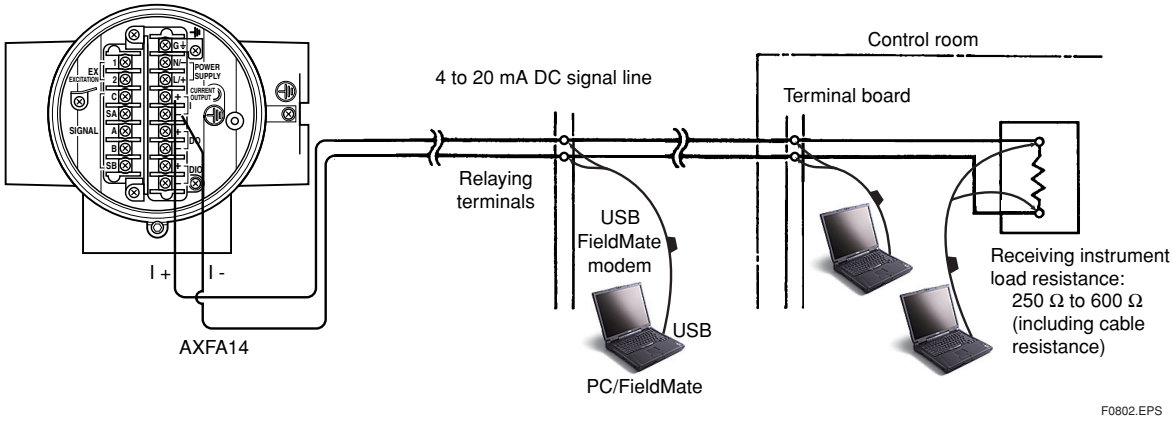

Figure 8.2.1 Interconnection Diagram

WARNING

Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work.
Under extremely rare case, the infra-red switches may respond unexpectedly in such conditions as sticking ball of water or extraneous substances on the surface of display panel glass according to the principle of infra-red switch operation.
Its probability rises in such cases as sticking rain water by storm or other similar situation and washing up work near flowmeter installation place.
Either to illuminate or stop illuminating the infra-red switches by the flashlight may cause the mis-reaction.
Refer to Chapter 6 “Menu P: Parameter Protection Items” and section “10.2.2” how to use the write protect function in detail. This menu in the 275 is located at [Hot key] → [2 Wrt Protect Menu].

IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

NOTE

Before updating any setting, remember to always check the data content you want to change as described in Chapter 6: Parameter Description.

NOTE

In case of HART Configuration, the parameters are displayed in English only.
Even if the language with the exception of English is selected at “Language” setting display, the parameters are displayed in English upon HART Configuration Tool.

8.3 Basic Setup

■ Tag and Device Information

The tag number and device information can be checked as follows:

- The location for the tag number and device information

(DD)

Tag	Device Setup → Detailed Setup → Basic setup → **Tag**
Descriptor	Device Setup → Detailed Setup → Device info → Field device info → **Descriptor**
Message	Device Setup → Detailed Setup → Device info → Field device info → **Message**
Date	Device Setup → Detailed Setup → Device info → Field device info → **Date**

T0803.EPS

(DTM)

Tag	Easy Setup → Tag or Configuration → HART → **Tag**
Descriptor	Configuration → Device infomation → **Descriptor**
Message	Configuration → Device infomation → **Message**
Date	Configuration → Device infomation → **Date**

T0804.EPS

When changing the tag number or device information, enter the information directly within the following limitations.

Item	Number and characters
Tag	8
Descriptor	16
Message	32
Date	2/2/2 (mm/dd/yy) • mm : month • dd : day • yy : year

T0805.EPS

8.4 Parameters

8.4.1 Parameter configuration

The parameter structure of the HART configuration tool is hierarchical.

Refer to 8.4.6, Menu Tree Example for the corresponding parameters. The menu tree shows a cross-reference of the parameters for HART and BRAIN.

See “Chapter 6 Parameter Description” for the functions of parameters.

Note that some display parameters of AXFA14 are different from those of HART configuration tools.

8.4.2 Data Renewing

There are two methods to load the AXFA14 data from/to HART Configuration Tool --- periodic data renewing and discretionary data renewing. Refer to the 8.4.6 menu tree for each corresponding parameter.

(1) Periodic Data Renewing
The data is updated 0.5 to 2 second cycles. The parameter of this type is marked as “P” in the 8.4.6 menu tree.

(2) Discretionary Data Renewing
The data can be loaded from/to the AXFA14 when the data save is finished to the Configuration Tool. The parameter of this type is marked as “u/d” in the 8.4.6 menu tree.

NOTE

The AXFA14 is not able to set parameters via its display unit during a communication of the HART Configuration Tool.

8.4.3 Self-diagnostic

The self-diagnostic function of the AXFA14 is explained in Section 6.5 “Alarm Functions.”
The HART configuration tool can be used to run self-diagnostics on a device and check for incorrect data settings.

(1) Using DD

The **Self test** and **Status** commands are available for self-diagnostics. When **Self test** is run, the display unit shows an error code and alarm message if the device detects any illegal parameter settings or functional faults.

- Procedure to call up the **Self test** display

Device Setup → Diag/Service → Test → Self test

If no error is detected, “Self test OK” is displayed on the configuration tool.
If the specific diagnostic item is known for the check, you can directly call up the item by using the **Status** command.
The status is categorized from 1 to 7.
Show an example below to confirm the status of Status group 1.

- Procedure to call up the **Status** display

Device Setup → Diag/Service → Status → Status group 1

If no error is detected, “Off” is displayed on the configuration tool.
If there is an error, “On” is displayed on the configuration tool, and a countermeasure for that error is necessary.

Example of display:	Span > 10 m/s	On
	Span < 0.3 m/s	Off
	TTL > 10000 p/s	Off
	TTL < 0.0001 p/s	Off
	4-20 Lmt Err	Off

The HART configuration tool diagnoses at each communication.
When an improper operation is performed, the error message is displayed.

(2) Using DTM

The **Device Status** commands are used for self-diagnostics. When **Device Status** is run, the display unit shows an error code and alarm message if the AXFA14 detects any illegal parameter settings or functional faults.

- Procedure to call up the **Device Status** display

Device Status

If no error is detected, “Status: Normal” is displayed on the configuration tool.
If the specific diagnostic item is known for the check, you can directly call up the item by using the Diagnostic List in the Device Status display.
The Diagnostic List is categorized to Device Status, Hardware Failure, Transducer Status, Diag Status, and Configuration.
If no error is detected, color symbol which shows Normal State is displayed on top of the error message.
If color symbol which shows Error State is displayed, there is an error and a countermeasure for that error is necessary.

The HART configuration tool diagnoses at each communication.
When an improper operation is performed, the error message is displayed.

8.4.4 HART Specific Functions

■ Trim Analog Output

This function is used to adjust the analog output at 4 mA and 20 mA with the D/A trim or Scaled D/A trim.

(1) D/A trim
Connect a calibration digital ammeter, and then enter the read value of the ammeter for each output of AXFA14.

- Procedure to call up the **D/A trim** display

DD	Device Setup → Diagnosis/Service → Adjustment → D/A trim
DTM	Calibration → D/A trim

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(2) Scaled D/A trim
The output is adjusted by using a voltmeter or other types of meters with 0 to 100% scale.
Example using a voltmeter:
4 mA DC → 1 V
20 mA DC → 5 V
Connect this meter, and enter the read value of the meter for each output of AXFA14.

- Procedure to call up the **Scaled D/A trim** display

DD	Device Setup → Diagnosis/Service → Calibration → Analog output trim →Scaled D/A trim
DTM	Calibration → Scaled D/A trim

T0809.EPS

IMPORTANT

The D/A trim should be executed only at single range mode. If the D/A trim is executed at Bi direction mode, it is possible that the current output becomes 108%.

IMPORTANT

When "**D/A trim**" or "**Scaled D/A trim**" is carried out, the warning message "**83: Fix Cur Wng**" is displayed on the display unit.

CAUTION

The output adjustment function can match the 4mA and 20mA output to the reference meter such as a voltmeter. In the output adjustment, it is necessary to use the calibrated voltmeter and resistance.

■ Fixed Current Output

This feature can be used to output a fixed current for loop checks.

● In the case of using DD

Call up the test output parameter (Loop test) and select the output signal.

• Procedure to call up the display

DD	Device Setup → Diagnosis/Service → Test → Loop test →
→ 4mA	Output a 4mA DC signal
→ 20mA	Output a 20mA DC signal
→ Other	Set a desired output signal value
→ End	Exit

T0806.EPS

● In the case of using DTM

Call up the test output parameter (Loop test) and select either manual test or auto test, and set the current value.

• Procedure to call up the display

DTM	Diag and Service → Output Test → Loop test →
→ Manual Test	Set the current value or % value at **Test output value**, then click the Start button.
→ Auto Test	Set the interval and rate of change of current output at **Auto Test Setting**, then click the Start button.

T0807.EPS

■ Burst Mode

AXFA14 continuously sends the data via HART communication when the burst mode is set on (any one of PV, % range/current, or process vars/crnt). The data is sent intermittently as a digital signal at 3 times a second.

The burst mode is set as follows.

(1) Setting the data to be sent

• Procedure to call up the display

DD	Device Setup → Detailed setup → HART output → Burst option
DTM	Configuration → HART → Burst option

T0810.EPS

Select the type of data to be sent from the following options:

- Instantaneous flow rate (PV)
- Output in % and current output (% range/current)
- Instantaneous flow rate, totalization value* and current output (Process vars/crnt)

* "Totl," "Reverse Totl" or "Dif Totl"

(2) Setting the burst mode

• Procedure to call up the display

DD	Device Setup → Detailed setup → HART output → Burst mode
DTM	Configuration → HART → Burst mode

T0811.EPS

Then, select "**On**" at the menu to start the burst mode.

To release from the burst mode, call up the burst mode display, and set to "**Off**."

The default setting is "**Off**."

■ Multidrop Mode

When set in the multidrop mode, up to 15 field devices in a single communications line can be connected. To activate multidrop communication, the address of the field devices must be set to a number from 1 to 15. This deactivates the 4 to 20 mA analog output, fixing it to 4 mA. Burn out is also disabled.

Note that the accuracy for multidrop mode is different from that for other modes. Refer to Chapter 11: Outline.

The multidrop mode is set as follows.

(1) Setting the polling address

• Procedure to call up the display

DD (HART 5)	Device Setup → Detailed setup → Output condition → HART output →
DTM (HART 5)	Configuration → HART →
→ Poll addr	Enter the number from 1 to 15

T0812.EPS

(2) Activating the multidrop mode
About the procedure to call up the **Polling** display, please refer to the User's Manual of each configuration tool.

NOTE

When the same polling address is assigned for two or more field devices in multidrop mode, communication with these field devices is disabled.

(3) Communication when set in the multidrop mode

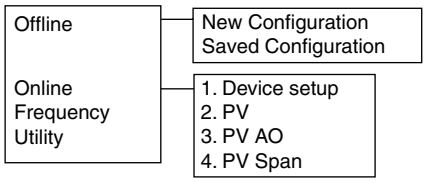
1. The HART configuration tool searches a field device that is set in the multidrop mode when the HART configuration tool is turned on. When the HART configuration tool is connected to the field device, the polling address and the tag will be displayed.
2. Select the field device, and then communication with it is possible. The communication speed is slow in this case.
3. To communicate with another field device, turn off the power once and then turn it back on, or call up "**Online**" menu, and select "**Online**." The polling address and the tag will appear. Select the field device.

(4) Release of the multidrop mode
Call up the "**Poll addr**" display, and set the address to "**0**."

8.4.5 Other operations for the HART configuration tool

Regarding other operations for the HART configuration tool, refer to the HART configuration tool operations manual.

8.4.6 Menu Tree for DD (HART 5)



					Read/Write	Parameter of BRAIN protocol	Data(*1)
1 Device setup	1 Process Variables	PV % rnge			R	A10	P
		PV			R	A20	P
		PV AO			R	A21	P
		Totl			R	A30	P
		Reverse Totl			R	A31	P
		Dif Totl			R	A32	P
	2 Diag/Service	1 Test/Status	1 Status	Status group 1(System alarms)	R	See Section 6.5 "Alarm Functions"	–
				Status group 3(Process alarms)	R		–
				Status group 5(Setting alarms)	R		–
				Status group 6(Setting alarms)	R		–
				Status group 7(Setting alarms)	R		–
				Status group 8(Warnings)	R		–
			2 Self test		W	–	–
		2 Adjustment	1 Auto Zero Exe		W	M10/B50	–
			2 Magflow Zero		R/W	M11	–
			3 D/A trim		W	–	–
			4 Scaled D/A trim		W	–	–
		3 Output Test	1 Loop test	4mA 20mA Other End	W	–	–
			2 Test Mode		W	N10	–
			3 Test DO		W	N30	–
			4 Test DIO (O)		W	N31	–
			5 Test DIO (I)		R	N32	P
		4 Diagnosis	1 Adhesion Check		W	K10	–
			2 Adhesion Level1		W	K11	–
			3 Adhesion Level2		W	K12	–
			4 Adhesion Level3		W	K13	–
			5 Adhesion Level4		W	K14	–
			6 Adh Measure Value		R	K15	–
	3 Easy Setup	1 Language			W	B10/H30	u/d
		2 PV Damping			W	B20/C11	u/d
		3 Base Flow Unit			W	B21/C40	u/d
		4 Base Time Unit			W	B22/C41	u/d
		5 PV Span			W	B23/C42	u/d
		6 Flow Decimal Pnt			W	B24/C43	u/d
		7 Total Unit			W	B30/D10	u/d
		8 Total Scale			W	B31/D11	u/d
		9 Pulse Unit			W	B32/E10	u/d
		Pulse Scale			W	B33/E11	u/d
		Display Select1			W	B40/H10	u/d
		Display Select2			W	B41/H11	u/d
		Display Select3			W	B42/H12	u/d
		Auto Zero Exe			W	B50/M10	–

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					Read/Write	Parameter of BRAIN protocol	Data(*1)
4 Detailed Setup	1 Basic Setup	1 Tag			W	C10	u/d
		2 PV Damping			W	C11/B20	u/d
		3 MF Set	Standard DF		W	C20	–
				Low MF	W	C21	–
				High MF	W	C22	–
			Enhanced DF		W	C20	–
				Low MF (EDF)	W	C23	–
				High MF (EDF)	W	C24	–
		4 Nominal Size unit			W	C31	u/d
		5 Nominal Size			W	C32	u/d
		6 Base Flow Unit			W	C40/B21	u/d
		7 Base Time Unit			W	C41/B22	u/d
		8 PV Span			W	C42/B23	u/d
		9 Flow Decimal Pnt			W	C43/B24	u/d
		Velocity Check			R	C44	P
		Density Unit			W	C45	u/d
		Mass Flow Density			W	C46	u/d
		User Span Select			W	C47	u/d
		Flow User Unit			W	C48	u/d
		Flow User Span			W	C49	u/d
	2 Total	1 Total Unit			W	D10/B30	u/d
		2 Total Scale			W	D11/B31	u/d
		3 Total Decimal Pnt			W	D12	u/d
		4 Total Low Cut			W	D13	u/d
		5 Total Execution			W	D20	u/d
		6 Ttl Set Val Lower			W	D21	u/d
		7 Ttl Set Val Upper			W	D22	u/d
		8 Ttl Switch Lower			W	D23	u/d
		9 Ttl Switch Upper			W	D24	u/d
		Ttl User Select			W	D30	u/d
		Ttl User Unit			W	D31	u/d
	3 Pulse	1 Pulse Unit			W	E10/B32	u/d
		2 Pulse Scale			W	E11/B33	u/d
		3 Pulse Width			W	E12	u/d
		4 Pulse Low Cut			W	E13	u/d
	4 Function Set	1 Status Function	1 DO Function		W	F20	u/d
			2 DIO Function		W	F21	u/d
			3 DO Active Mode		W	F22	u/d
			4 DIO Active Mode		W	F23	u/d
			5 Forward Span2		W	F30	u/d
			6 Forward Span3		W	F31	u/d
			7 Forward Span4		W	F32	u/d
			8 Reverse Span1		W	F33	u/d
			9 Reverse Span2		W	F34	u/d
			Auto Range Hys		W	F40	u/d
			Bi Direction Hys		W	F41	u/d
		2 Alarm	1 Low Alarm		W	G10	u/d
			2 High Alarm		W	G11	u/d
			3 Low Low Alarm		W	G12	u/d
			4 High High Alarm		W	G13	u/d
			5 H/L Alarm Hys		W	G14	u/d
			6 4-20 Alarm Out		W	G21	u/d
			7 4-20 Burn Out		R	G22	–
			8 Alm-Setting		W	G30	u/d
			9 Alm-Sig Over		W	G31	u/d
			Alm-Emp Pipe		W	G32	u/d
			Alm-HH/LL		W	G33	u/d
			Alm-Adhesion		W	G34	u/d

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F0804.EPS

					Read/Write	Parameter of BRAIN protocol	Data(*1)
4 Detailed setup	4 Function Set	3 Alm Record	1 Operation Time		R	G40	P
			2 Alm Record1		R	G41	P
			3 Alm Record Time1		R	G42	P
			4 Alm Record2		R	G43	P
			5 Alm Record Time2		R	G44	P
			6 Alm Record3		R	G45	P
			7 Alm Record Time3		R	G46	P
			8 Alm Record4		R	G47	P
			9 Alm Record Time4		R	G48	P
		4 Display Set	1 Display Select1		W	H10/B40	u/d
			2 Display Select2		W	H11/B41	u/d
			3 Display Select3		W	H12/B42	u/d
			4 Display Cycle		W	H20	u/d
			5 Language		W	H30/B10	u/d
		5 Aux	1 4-20mA Low Cut		W	J10	u/d
			2 4-20mA Low Lmt		W	J11	u/d
			3 4-20mA High Lmt		W	J12	u/d
			4 Flow Direction		W	J20	u/d
			5 Rate Limit		W	J21	–
			6 Dead Time		W	J22	–
			7 Pulsing Flow		W	J23	–
			8 T/P Damp Select		W	J24	–
			9 Power Synch		W	J30	–
			Power Frequency		R/W	J31	P
			Memo 1		W	J40	–
			Memo 2		W	J41	–
			Memo 3		W	J42	–
			Software Rev No		R	J50	–
	5 HART output	1 Poll addr			W	–	–
		2 Num req preams			R	–	–
		3 Burst mode			W	–	–
		4 Burst option	1 PV		W	–	–
			2 % range/current		W	–	–
			3 Process vars/crnt		W	–	–
	6 Device info	1 Field device info	1 Manufacturer		R	–	–
			2 Tag		W	–	u/d
			3 Descriptor		W	–	u/d
			4 Message		W	–	u/d
			5 Date		W	–	u/d
			6 Dev id		R	–	–
			7 Write protect		R	–	P
			8 Revision #'s	1 Universal rev	R	–	–
				2 Fld dev rev	R	–	–
				3 Software rev	R	–	–
		2 Model specific	1 Use		W	–	–
			2 Lining		W	–	–
			3 Electrode Material		W	–	–
			4 Electrode Struct		W	–	–
			5 Grounding Ring		W	–	–
			6 Process Connect		W	–	–
			7 Lay Length		W	–	–
			8 Electrical Conn		W	–	–
			9 Sensor Serial No		W	–	–

(continued on next page)

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			Read/Write	Parameter of BRAIN protocol	Data(*1)
5 Review	1 Review1		R	–	–
	2 Review2		R	–	–
	3 Review3		R	–	–
	4 Review4		R	–	–
	Hot key	1 PV Span	W	B23/C42	u/d
		2 Wrt Protect Menu			
			R	P20	P
		1 Write protect	W	P21	–
		2 Enable Wrt 10min	W	P22	–
		3 New Password	R	P23	–
		4 Software Seal			

*1 : Data Renewing
P : Periodic Date Renewing
u/d : Discretionary Renewing
– : Other (Method etc...)

F0806.EPS

Review 1
Tag
PV Damping
Measure Mode
Low MF
High MF
Low MF(EDF)
High MF(EDF)
Nominal Size unit
Nominal Size
Base Flow Unit
Base Time Unit
PV Span
Flow Decimal Pnt
Velocity Check
Density Unit
Mass Flow Density
User Span Select
Flow User Unit
Flow User Span
Total Unit
Total Scale
Total Decimal Pnt
Total Low Cut
Total Execution
Ttl Set Val Lower
Ttl Set Val Upper
Ttl Switch Lower
Ttl Switch Upper
Ttl User Select
Ttl User Unit
Pulse Unit
Pulse Scale
Pulse Width
Pulse Low Cut

Review 2
DO Function
DIO Function
DO Active Mode
DIO Active Mode
Forward Span2
Forward Span3
Forward Span4
Reverse Span1
Reverse Span2
Auto Range Hys
Bi Direction Hys
Low Alarm
High Alarm
Low Low Alarm
High High Alarm
H/L Alarm Hys
4-20 Alarm Out
4-20 Burn Out
Alm-Setting
Alm-Sig Over
Alm-Emp Pipe
Alm-HH/LL
Alm-Adhesion
Operation Time
Alm Record1
Alm Record Time1
Alm Record2
Alm Record Time2
Alm Record3
Alm Record Time3
Alm Record4
Alm Record Time4

Review 3
Display Select1
Display Select2
Display Select3
Display Cycle
Language
4-20mA Low Cut
4-20mA Low Lmt
4-20mA High Lmt
Flow Direction
Rate Limit
Dead Time
Pulsing Flow
T/P Damp Select
Power Synch
Power Frequency
Memo1
Memo2
Memo3
Software Rev No
Use
Lining
Electrode Material
Electrode Struct
Grounding Ring
Process Connect
Lay Length
Electrical Conn
Sensor Serial No
Adhesion Check
Adhesion Level1
Adhesion Level2
Adhesion Level3
Adhesion Level4
Adh Measure Value

Review 4
Poll addr
Num req preams
Burst mode
Burst option
Manufacturer
Tag
Descriptor
Message
Date
Dev id
Write protect
Universal rev
Fld dev rev
Software rev

Status 1
uP Fault
EEPROM Fault
A/D(H) Fault
A/D(L) Fault
A/D(Z) Fault
Coil Open
EEPROM Dflt

Status 3
Sig Overflow
Empty Pipe
HH/LL Alm
Adhesion Alm

Status 5
Span > 10m/s
Span < 0.1m/s
TTL>10000p/s
TTL<0.0001p/s
4-20 Lmt Err
Multi Rng Err
H/L HH/LL Set
Dens Set Err

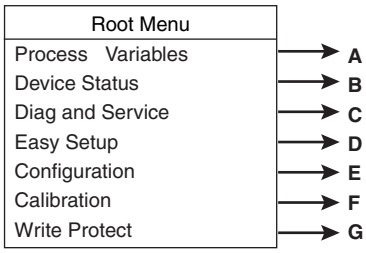
Status 6
PLS>10000p/s
PLS > 5000p/s
PLS > 1000p/s
PLS > 500p/s
PLS > 25p/s
PLS > 15p/s
PLS > 10p/s
PLS > 5p/s

Status 7
PLS<0.0001p/s
Meas Mod Set
Size Set Err
Adh Set Err

Status 8
Adhesion Wng
Auto Zero Wng
Fix Cur Wng

F0807.EPS

8.4.7 Menu Tree for DTM (HART 5)



A

Process Variables	PV	Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)
	PV	R	A20	P
	PV % rnge	R	A10	P
	PV AO	R	A21	P
	PV Span	R	B23	P
	PV Damping	R	C11/B20	P
	Totl	R	A30	P
	Reverse Totl	R	A31	P
	Dif Totl	R	A32	P

B

Device Status	Process Variable	
		PV
		PV % rnge
		Totl
		Reverse Totl
		Dif Totl
	Diagnostic List	
		Device Status
		Hardware Failure
		Transducer Status
		Configuration
		Warning

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C

			Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)
Diag and Service	Output Test	Loop test	–	–	–
		Test Mode	W	N10	–
		Test DO	W	N30	–
		Test DIO (I)	R	N32	P
		Test DIO (O)	W	N31	–
	Alarm Set	Low Alarm	W	G10	u/d
		High Alarm	W	G11	u/d
		Low Low Alarm	W	G12	u/d
		High High Alarm	W	G13	u/d
		H/L Alarm Hys	W	G14	u/d
		4-20mA Alarm Out	W	G21	u/d
		4-20mA Burn Out	R	G22	–
		Alm-Setting	W	G30	u/d
		Alm-Sig Over	W	G31	u/d
		Alm-Emp Pipe	W	G32	u/d
		Alm-HH/LL	W	G33	u/d
		Alm-Adhesion	W	G34	u/d
	Alarm Record	Operation Time	R	G40	P
		Alm Record1	R	G41	P
		Alm Record Time1	R	G42	P
		Alm Record2	R	G43	P
		Alm Record Time2	R	G44	P
		Alm Record3	R	G45	P
		Alm Record Time3	R	G46	P
		Alm Record4	R	G47	P
		Alm Record Time4	R	G48	P
	Adhesion	Adhesion Check	W	K10	–
		Adhesion Level1	W	K11	–
		Adhesion Level2	W	K12	–
		Adhesion Level3	W	K13	–
		Adhesion Level4	W	K14	–
		Adh Measure Value	R	K15	–

D

		Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)
Easy Setup	Tag	W	C10	u/d
	Language	W	B10/H30	u/d
	PV Damping	W	B20/C11	u/d
	Base Flow Unit	W	B21/C40	u/d
	Base Time Unit	W	B22/C41	u/d
	PV Span	W	B23/C42	u/d
	Flow Decimal Pnt	W	B24/C43	u/d
	Total Unit	W	B30/D10	u/d
	Total Scale	W	B31/D11	u/d
	Pulse Unit	W	B32/E10	u/d
	Pulse Scale	W	B33/E11	u/d
	Display Select1	W	B40/H10	u/d
	Display Select2	W	B41/H11	u/d
	Display Select3	W	B42/H12	u/d
	Auto Zero Exe	–	–	–

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E

Configuration			Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)
	Characterize Meter	Nominal Size Unit	W	C31	u/d
		Nominal Size	W	C32	u/d
		Measure Mode	R	C20	–
		Low MF	R	C21	–
		High MF	R	C22	–
		Low MF (EDF)	R	C23	–
		High MF (EDF)	R	C24	–
		MF Set	–	–	–
	Flow Condition	PV Damping	W	C11/B20	u/d
		Base Flow Unit	W	C40/B21	u/d
		Base Time Unit	W	C41/B22	u/d
		PV Span	W	C42/B23	u/d
		Flow Decimal Pnt	W	C43/B24	u/d
		User Span Select	W	C44	P
		Flow User Unit	W	C45	u/d
		Flow User Span	W	C46	u/d
		Velocity Check	R	C47	u/d
		Density Unit	W	C48	u/d
		Mass Flow Density	W	C49	u/d
	Total Set	Total Unit	W	D10/B30	u/d
		Total Scale	W	D11/B31	u/d
		Total Decimal Pnt	W	D12	u/d
		Total Low Cut	W	D13	u/d
		Total Execution	W	D20	u/d
		Ttl Set Val Lower	W	D21	u/d
		Ttl Set Val Upper	W	D22	u/d
		Ttl Switch Lower	W	D23	u/d
		Ttl Switch Upper	W	D24	u/d
		Ttl User Select	W	D30	u/d
		Ttl User Unit	W	D31	u/d
	Pulse Set	Pulse Unit	W	E10/B32	u/d
		Pulse Scale	W	E11/B33	u/d
		Pulse Low Cut	W	E13	u/d
		Pulse Width	W	E12	u/d
	Status Function	DO Function	W	F20	u/d
		DIO Function	W	F21	u/d
		DO Active Mode	W	F22	u/d
		DIO Active Mode	W	F23	u/d
		Auto Range Hys	W	F40	u/d
		Bi Direction Hys	W	F41	u/d
		Forward Span2	W	F30	u/d
		Forward Span3	W	F31	u/d
		Forward Span4	W	F32	u/d
		Reverse Span1	W	F33	u/d
		Reverse Span2	W	F34	u/d

(continued on next page)

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Configuration	Display Set	Display Select1	W	H10/B40	u/d
		Display Select2	W	H11/B41	u/d
		Display Select3	W	H12/B42	u/d
		Display Cycle	W	H20	u/d
		Language	W	H30/B10	u/d
	Aux	4-20mA Low Cut	W	J10	u/d
		4-20mA Low Lmt	W	J11	u/d
		4-20mA High Lmt	W	J12	u/d
		Flow Direction	W	J20	u/d
		Rate Limit	W	J21	–
		Dead Time	W	J22	–
		Pulsing Flow	W	J23	–
		T/P Damp Select	W	J24	–
		Power Synch	W	J30	–
		Power Frequency	R/W	J31	P
		Memo 1	W	J40	–
		Memo 2	W	J41	–
		Memo 3	W	J42	–
		Software Rev No	R	J50	–
	Model Specification	Use	W	–	–
		Lining	W	–	–
		Electrode Material	W	–	–
		Electrode Struct	W	–	–
		Grounding Ring	W	–	–
		Process Connect	W	–	–
		Lay Length	W	–	–
		Electrical Conn	W	–	–
		Sensor Serial No	W	–	–
	Device Information	Model	R	–	–
		Manufacturer	R	–	–
		Hardware rev	R	–	–
		Software rev	R	–	–
		Descriptor	W	–	–
		Message	W	–	–
		Date	W	–	–
		Final asmbly num	W	–	–
	HART	Tag	W	–	u/d
		Poll addr	W	–	–
		Dev id	R	–	–
		Universal rev	R	–	–
		Fld dev rev	R	–	–
		Num req preams	R	–	–
		Physical signl code	R	–	–
		Burst mode	W	–	–
		Burst option	W	–	–

Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)

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F

		Read/Write	Parameter of BRAIN protocol	Data Renewing (*1)
Calibration	Auto Zero Exe	–	M10/B50	–
	Magflow Zero	R/W	M11	–
	D/A trim	–	–	–
	Scaled D/A trim	–	–	–

G

Write Protect	Write protect	R	P20	P
	Enable Wrt Password	W	P21	–
	New Password	W	P22	–
	Software Seal	R	P23	–

*1: Data Renewing
P : Periodic Data Renewing
u/d : Discretionary Data Renewing
– : Others (Method, etc...)

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9. ACTUAL OPERATION

After you have installed the flowtube into the process piping, wired the input/output terminals, set up the required parameters, and performed a pre-operation zero adjustment, the magnetic flowmeter should output an accurate flow signal from its terminals as soon as flow of the fluid to be measured begins. This section describes zero adjustment and the corresponding procedures.

For FOUNDATION Fieldbus protocol, please refer to IM 01E20F02-01E.

For PROFIBUS PA protocol, please refer to IM 01E20F12-01E.

9.1 Pre-operation Zero Adjustment

Zero adjustment is carried out to ensure that the output for zero flow is 0% (i.e., 4 mA). Although adjustment to zero is performed at the manufacturing plant prior to shipment, this procedure must be carried out once again following the installation of piping in order to match the magnetic flowmeter to its operating conditions.

This section describes the zero adjustment procedure using display unit switches from the converter and using the external status input; accordingly, one of these methods should be selected and implemented.

IMPORTANT

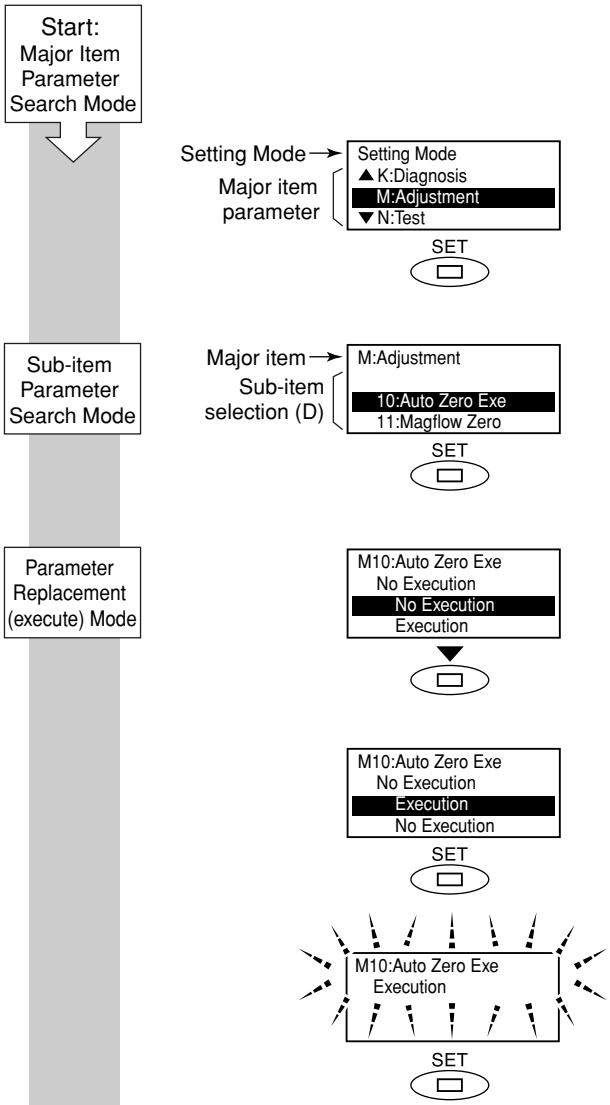
- Zero adjustment should be carried out before actual operation. Note that setting and update functions cannot be carried out during this procedure (i.e., for approximately 30 seconds).
- Zero adjustment should only be carried out when the flowtube has been filled with measurement fluid and the fluid velocity is completely zero by closing the valve.
- Each time that the fluid being measured is changed, it will be necessary for zero adjustment to be carried out for the new fluid.

9.1.1 Zero Adjustment Using Display Unit Switches

This section describes the procedure for zero adjustment using the display unit switches. (For more details regarding setting methods using these switches, refer to Chapter 5: Basic Operating Procedures.)

The parameters for zero adjustment are **B50/M10: Auto Zero Exe** (and either of these can be used to carry out this procedure). For more details regarding these parameters, refer to Chapter 6: Parameter Description.

The parameter **M10: Auto Zero Exe** will be used in the following description.



Once in Setting Mode, use the ▼ switch to move the cursor to **M: Adjustment.**

Touch the SET switch to access Sub-item Parameter Search Mode.

Upon selection of **M: Adjustment**, the cursor will be positioned at **M10: Auto Zero Exe**. (Sub-item selection (D))
Touch the SET switch to access Parameter Replacement Mode.

Touch the ▼ switch to move the cursor to "Execution".

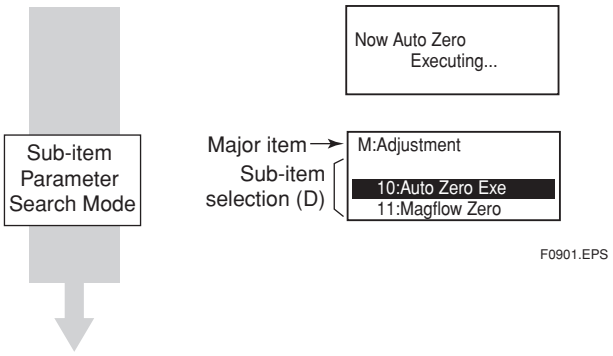
Touch the SET switch to select the "Execution".

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix selection of the automatic zero adjustment function.

NOTE

When no operations are carried out for 20 seconds in the flashing state, the system will automatically return to the Sub-item Parameter Search Mode.

When the operations except SET are carried out, the parameter cannot be set.



Auto zero adjustment function is being executed (about 30 seconds).

When zero adjustment function has been completed, the system automatically returns to the sub-item selection screen (D).

NOTE

The results of **M10: Auto Zero Exe** can be displayed using **M11: Magflow Zero**. Alternatively, if the results of the automatic zero adjustment exceed the rated value, the warning **82: Auto Zero Wng** will be displayed.

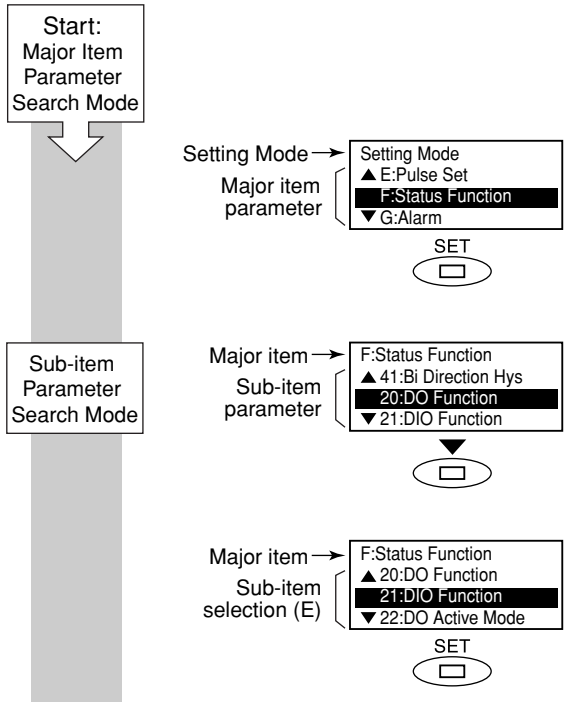
9.1.2 Zero Adjustment via External Status Input

This section describes the procedure for zero adjustment via external status input. (For more details regarding external status input, refer to Chapter 6: Parameter Description.)

CAUTION

In certain cases where the multiple range function is being used with other status inputs, it may not be possible to perform settings for automatic zero adjustment. For more details, refer to the description of multiple ranges from Chapter 6: Parameter Description.

In order to carry out zero adjustment via external status input, it will be necessary to set "Ext Auto Zero (I)" using **F21: DIO Function**. The following describes the setting procedure:

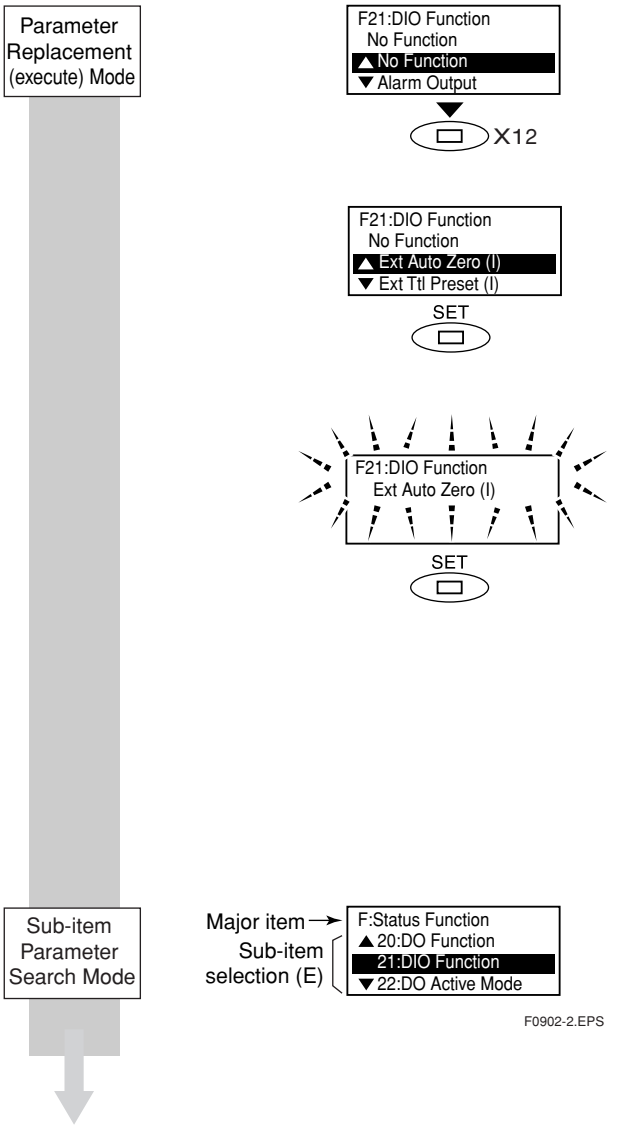


Once in Setting Mode, use the ▼ switch to move the cursor to **F: Status Function**.

Touch the SET switch to access Sub-item Parameter Search Mode.

Touch the ▼ switch once to move the cursor to **F21: DIO Function**.

The cursor has been moved to **F21: DIO Function** in this screen. (Sub-item selection screen (E))
Touch the SET switch to access Parameter Replacement Mode.



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Touch the ▼ switch twelve times to move the cursor to "Ext Auto Zero (I)".

Touch the SET switch to select "Ext Auto Zero (Zero adjustment via external status input)".

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix selection of the automatic zero adjustment function.

NOTE

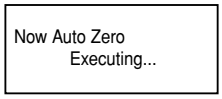
When no operations are carried out for 20 seconds in the flashing state, the system will automatically return to the Sub-item Parameter Search Mode.

When the operations except SET are carried out, the parameter cannot be set.

The system automatically returns to sub-item selection screen (E).

Zero adjustment will be started if the DIO terminals are shorted (when the active mode has been set to "Closed/Short Act" using **F23: DIO Active Mode**).

This process will end after approximately 30 seconds.



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Auto zero adjustment function is being executed. (about 30 seconds.)

NOTE

When the DIO terminals continue to be shorted, this zero adjustment is automatically repeated.

10. MAINTENANCE

10.1 Maintenance

WARNING

- Maintenance work must be carried out by the trained personnel having knowledge of safety standard and not by operators.
- When opening the cover, wait for more than 10 minutes after turning off the power. Furthermore, opening of the cover must also be carried out by the trained personnel having knowledge of safety standard.

CAUTION

- Explosion protected type must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
- The display cover is locked by the special screw. In case of opening the display cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover.

IMPORTANT

- As a rule, maintenance of this flowmeter should be implemented in a maintenance service shop where the necessary tools are provided.
- The amplifier assembly contains sensitive parts that may be damaged by static electricity. Excercise care so as not to directly touch the electronic parts or circuit patterns on the board, for example, by preventing static electrification by using grounded wrist straps when handing the assembly.

10.1.1 Fuse Replacement

CAUTION

Please contact Yokogawa's service office for fuse replacement. Also be sure to use the fuse that was supplied by Yokogawa's sales or service offices.

10.1.2 Changing the Direction of the Display Unit

10.1.2.1 Removing the Cover

(1) Turn off the power.

(2) Loosen cover locking screw 1 clockwise using a hexagonal wrench (nominal size 3) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is locked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

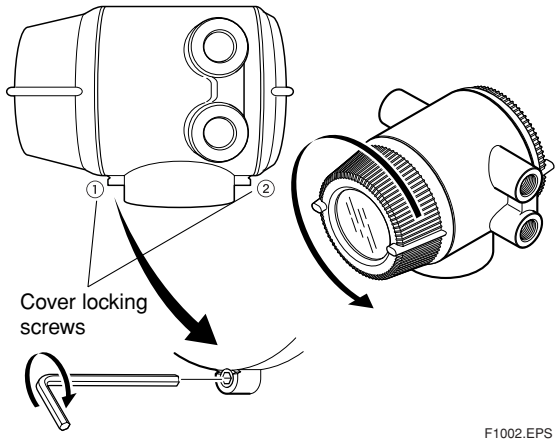

Figure 10.1.1 Removing the Display Cover

10.1.2.2 Changing the Display Unit Direction 90 Degrees

(1) Hold the display unit with your hand and remove the two mounting screws.

(2) Turn the display unit 90 degrees clockwise and confirm the assembling position, taking care of the connector and wire of the display unit.
At this time, do not remove the connector.

(3) Secure the display unit using its two mounting screws.

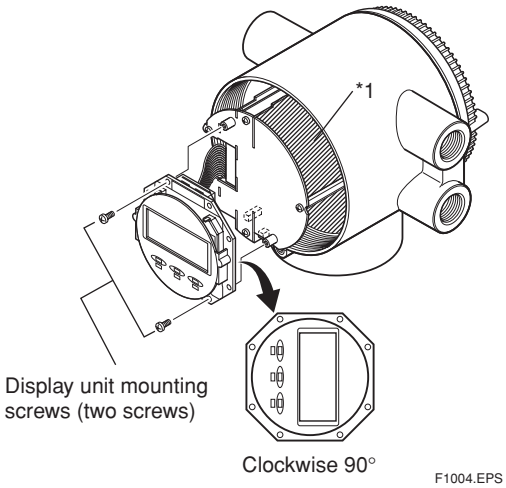

Figure 10.1.2 Changing the Display Unit Direction 90 Degrees

IMPORTANT

*1: To preserve the safety, do not touch the electrical circuit and cable of shaded area.

10.1.2.3 Installing the Cover

(1) Taking care not to entangle the cables, install the cover to the flowmeter by turning it in the direction of the arrow as shown below.

(2) Tighten cover locking screw 1 counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

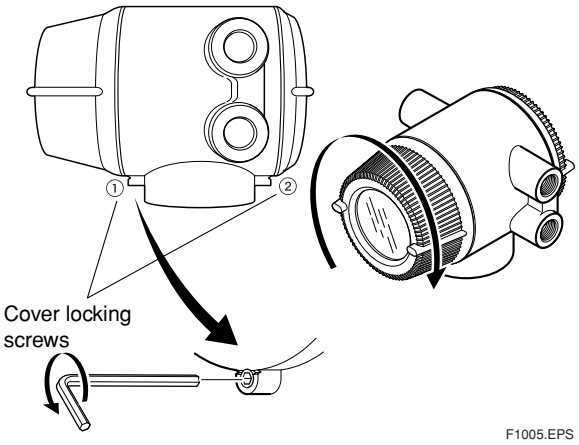

Figure 10.1.3 Installing the Display Cover

10.2 Setting of Switches

IMPORTANT

- Removing and installing cover are necessary for setting switches. Perform removing and installing of the cover as described in section 10.1.2.1 and 10.1.2.3.
- To preserve the safety, do not touch the electrical circuit and the cables except the setting switches.

10.2.1 Setting of Burnout Switch

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing plant, the burnout direction is set to High (i.e., 25 mA); however, in cases where the optional code C1 has been specified, the output direction will be set to Low (i.e., 0 mA).

Modification of the burnout direction must be carried out using the setting switch from the amplifier's CPU board (i.e., Switch 1) (See Figure 10.2.1).

Table 10.2.1 Output Setting Pins for Burnout

Position of Pin	Burnout Direction	Burnout Output	Remarks
Low High	High	25 mA	Set to High before shipment
Low High	Low	0 mA	Set to Low for optional code C1

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NOTE

- On the amplifier's CPU board, the burnout setting switch (i.e., Switch 1) and the write protect switch (i.e., Switch 2) are located adjacent to each other. Accordingly, special care should be taken when making switch settings.
- In the case of Fieldbus communication type, burnout setting swich is not applied.

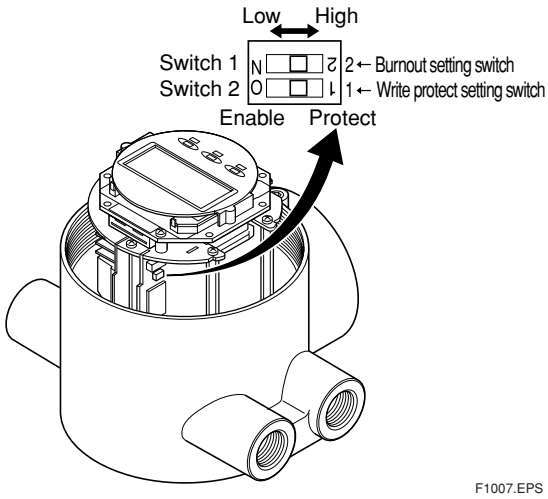


Figure 10.2.1 Switch Configuration

10.2.2 Setting of Write Protect Switch

By setting the write protect function to "Protect" it is possible to prevent the overwriting of parameters. Write protection can be carried out using either the hardware switch on the CPU board (i.e., Switch 2) or software parameter settings. If either of these items is set to "Protect," the overwriting of parameters will be prohibited.

NOTE

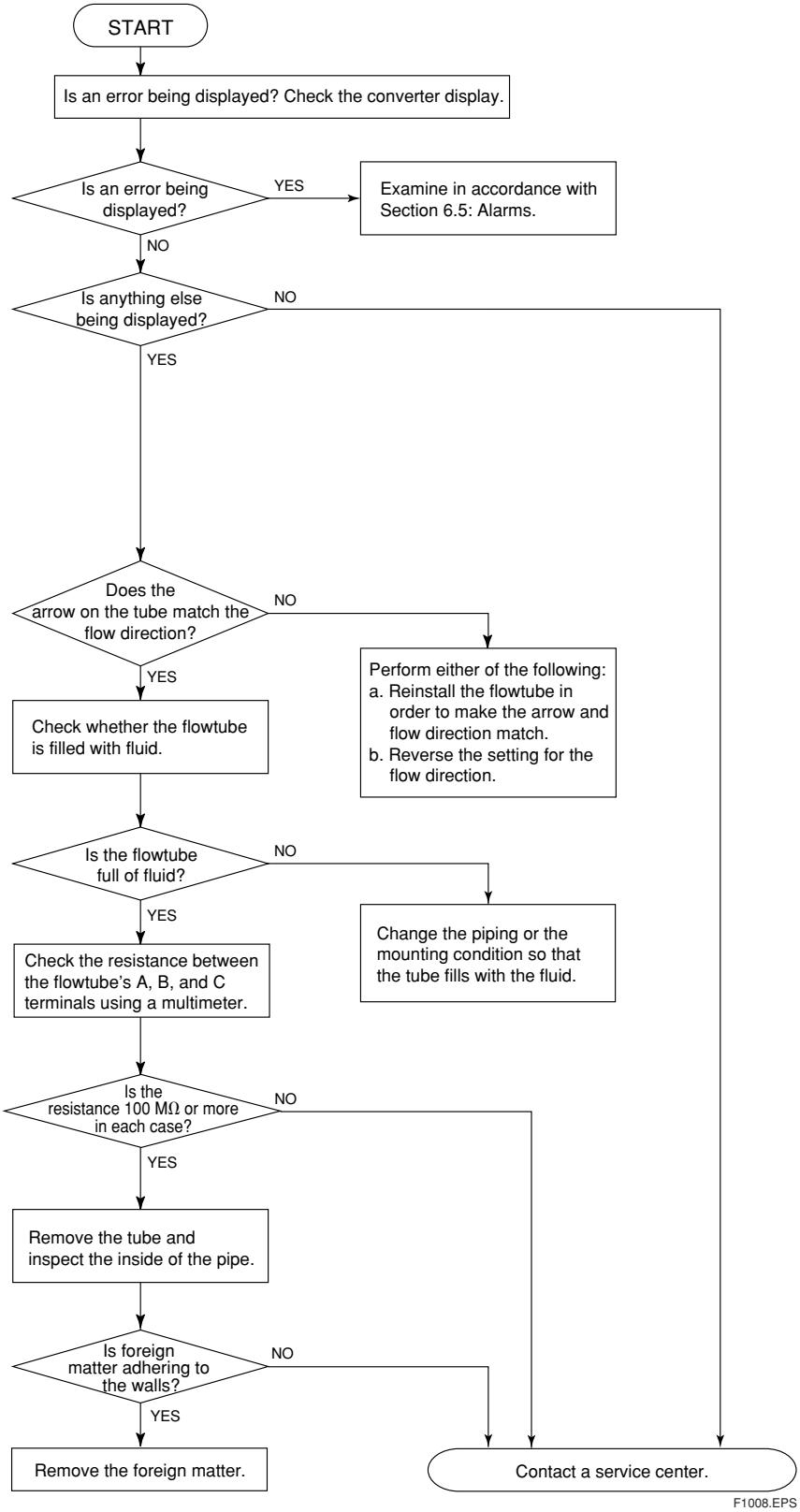
- If the hardware switch is set to "Protect," it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to "Enable."
- In the case of Fieldbus communication type, write protect setting switch is always be set as "Enable".

For more details regarding usage of the write protect function and the software's parameter switches, refer to "Chapter 6: Parameter Description" in this user's manual.

10.3 Troubleshooting

Although magnetic flowmeters rarely require maintenance, failures may occur when the instrument is not operated correctly. This section describes troubleshooting procedures where the cause of the breakdown is identified through receiver indication.

10.3.1 No Indication


START
Is an error being displayed? Check the converter display.
Is an error being displayed?
YES
Examine in accordance with Section 6.5: Alarms.
NO
Is anything else being displayed?
NO
YES
Does the arrow on the tube match the flow direction?
NO
Perform either of the following:
a. Reinstall the flowtube in order to make the arrow and flow direction match.
b. Reverse the setting for the flow direction.
YES
Check whether the flowtube is filled with fluid.
Is the flowtube full of fluid?
NO
Change the piping or the mounting condition so that the tube fills with the fluid.
YES
Check the resistance between the flowtube's A, B, and C terminals using a multimeter.
Is the resistance 100 MΩ or more in each case?
NO
YES
Remove the tube and inspect the inside of the pipe.
Is foreign matter adhering to the walls?
NO
YES
Remove the foreign matter.
Contact a service center.
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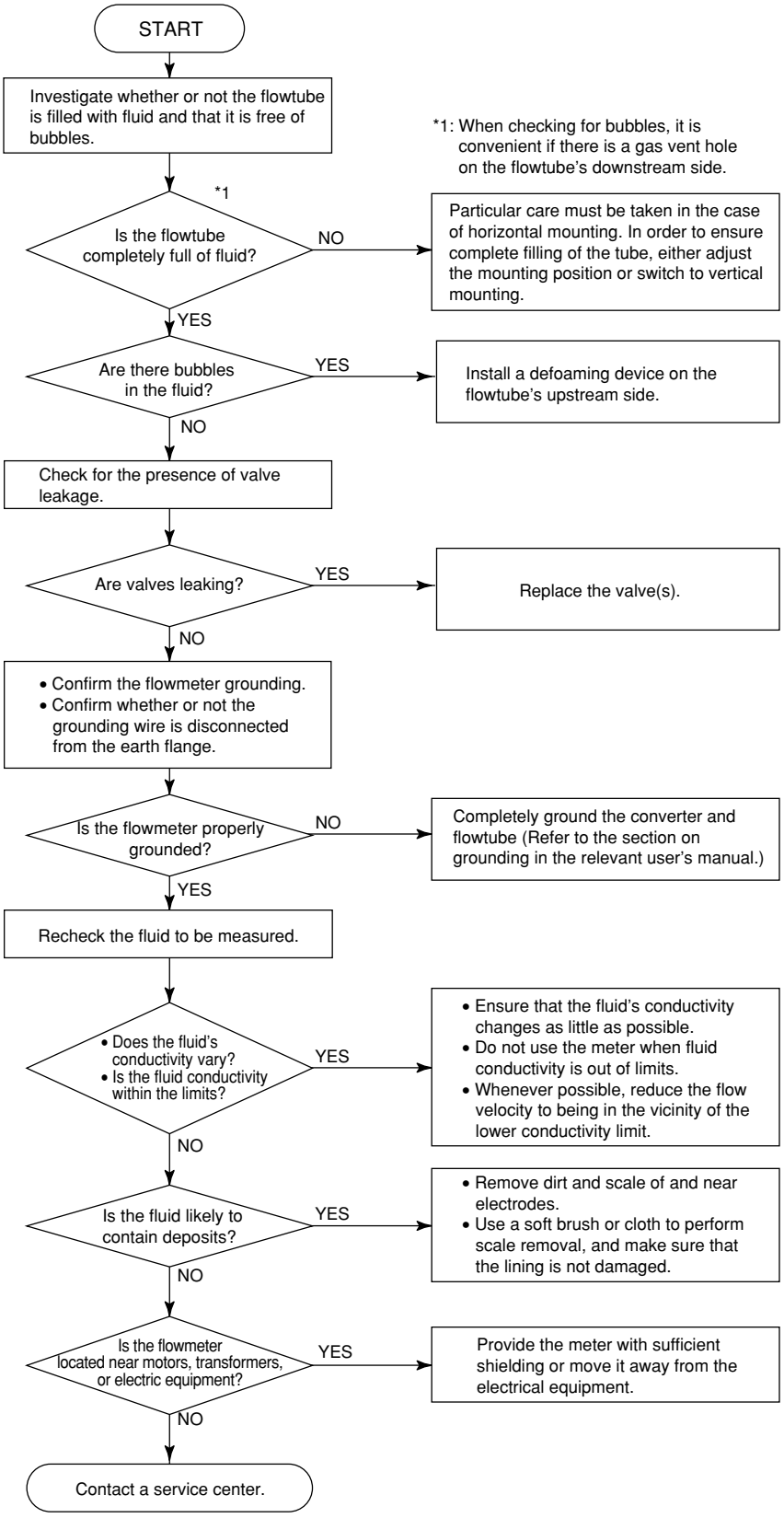
10.3.2 Unstable Zero


START
Investigate whether or not the flowtube is filled with fluid and that it is free of bubbles.
*1: When checking for bubbles, it is convenient if there is a gas vent hole on the flowtube's downstream side.
*1
Is the flowtube completely full of fluid?
NO
Particular care must be taken in the case of horizontal mounting. In order to ensure complete filling of the tube, either adjust the mounting position or switch to vertical mounting.
YES
Are there bubbles in the fluid?
YES
Install a defoaming device on the flowtube's upstream side.
NO
Check for the presence of valve leakage.
Are valves leaking?
YES
Replace the valve(s).
NO
• Confirm the flowmeter grounding.
• Confirm whether or not the grounding wire is disconnected from the earth flange.
Is the flowmeter properly grounded?
NO
Completely ground the converter and flowtube (Refer to the section on grounding in the relevant user's manual.)
YES
Recheck the fluid to be measured.
• Does the fluid's conductivity vary?
• Is the fluid conductivity within the limits?
YES
• Ensure that the fluid's conductivity changes as little as possible.
• Do not use the meter when fluid conductivity is out of limits.
• Whenever possible, reduce the flow velocity to being in the vicinity of the lower conductivity limit.
NO
Is the fluid likely to contain deposits?
YES
• Remove dirt and scale of and near electrodes.
• Use a soft brush or cloth to perform scale removal, and make sure that the lining is not damaged.
NO
Is the flowmeter located near motors, transformers, or electric equipment?
YES
Provide the meter with sufficient shielding or move it away from the electrical equipment.
NO
Contact a service center.

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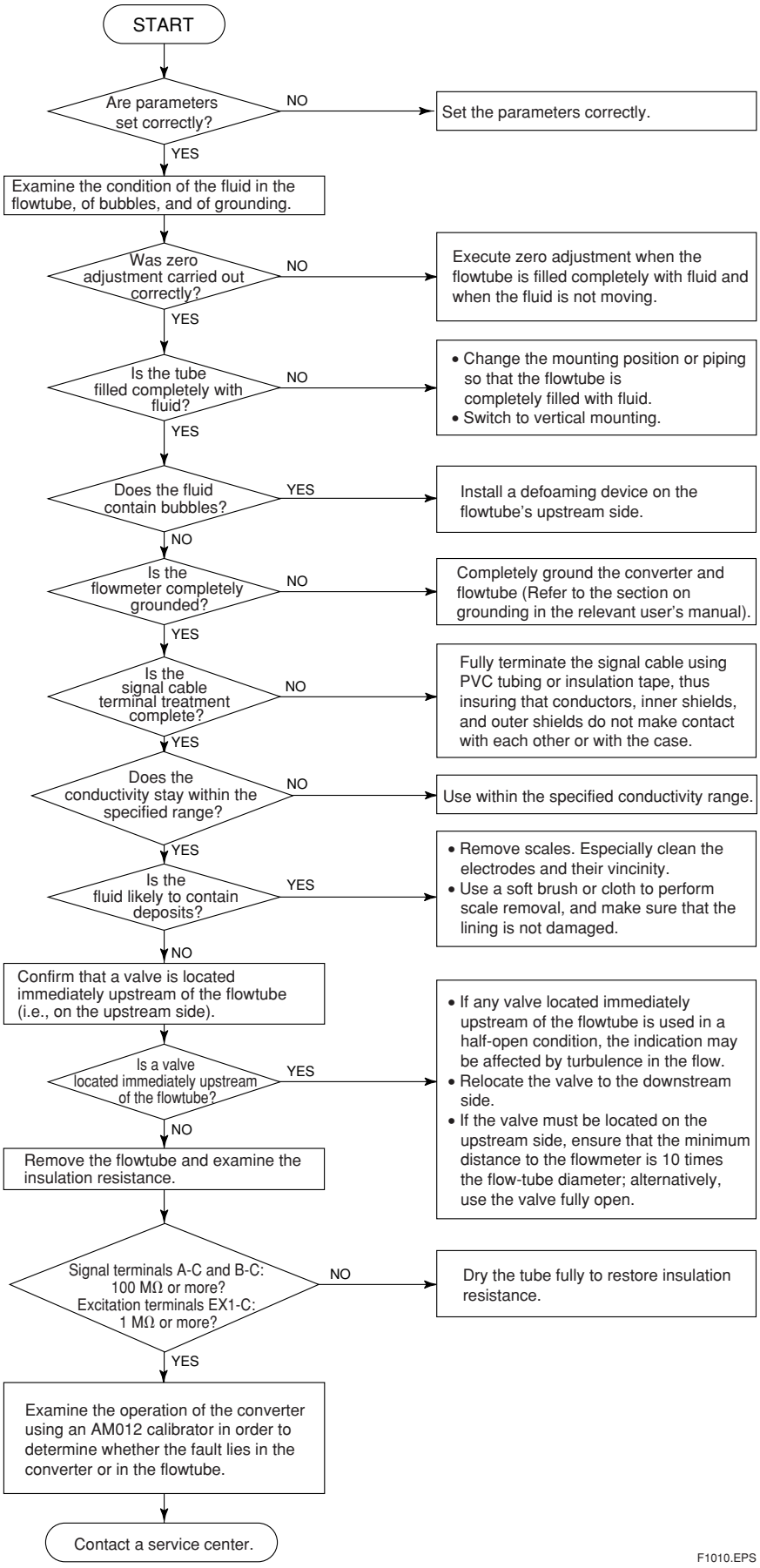
10.3.3 Disagreement Between Indication and Actual Flow


START
Are parameters set correctly?
NO
Set the parameters correctly.
YES
Examine the condition of the fluid in the flowtube, of bubbles, and of grounding.
Was zero adjustment carried out correctly?
NO
Execute zero adjustment when the flowtube is filled completely with fluid and when the fluid is not moving.
YES
Is the tube filled completely with fluid?
NO
• Change the mounting position or piping so that the flowtube is completely filled with fluid.
• Switch to vertical mounting.
YES
Does the fluid contain bubbles?
YES
Install a defoaming device on the flowtube's upstream side.
NO
Is the flowmeter completely grounded?
NO
Completely ground the converter and flowtube (Refer to the section on grounding in the relevant user's manual).
YES
Is the signal cable terminal treatment complete?
NO
Fully terminate the signal cable using PVC tubing or insulation tape, thus insuring that conductors, inner shields, and outer shields do not make contact with each other or with the case.
YES
Does the conductivity stay within the specified range?
NO
Use within the specified conductivity range.
YES
Is the fluid likely to contain deposits?
YES
• Remove scales. Especially clean the electrodes and their vincinity.
• Use a soft brush or cloth to perform scale removal, and make sure that the lining is not damaged.
NO
Confirm that a valve is located immediately upstream of the flowtube (i.e., on the upstream side).
Is a valve located immediately upstream of the flowtube?
YES
• If any valve located immediately upstream of the flowtube is used in a half-open condition, the indication may be affected by turbulence in the flow.
• Relocate the valve to the downstream side.
• If the valve must be located on the upstream side, ensure that the minimum distance to the flowmeter is 10 times the flow-tube diameter; alternatively, use the valve fully open.
NO
Remove the flowtube and examine the insulation resistance.
Signal terminals A-C and B-C: 100 MΩ or more?
Excitation terminals EX1-C: 1 MΩ or more?
NO
Dry the tube fully to restore insulation resistance.
YES
Examine the operation of the converter using an AM012 calibrator in order to determine whether the fault lies in the converter or in the flowtube.
Contact a service center.

F1010.EPS

11. OUTLINE

■ STANDARD SPECIFICATIONS

Refer to IM 01E20F02-01E for FOUNDATION Fieldbus communication type and IM 01E20F12-01E for PROFIBUS PA communication type marked with "◇"

● Converter

*1: Select two points from: one pulse output, one alarm output, one status input, or two status outputs.
*2: For models without an indicator, the hand-held terminal is necessary to set parameters.

Excitation Method: (Combined with AXF Remote Flowtube)
- Standard dual frequency excitation:
  Size 2.5 to 400 mm (0.1 to 16 in.)
- Enhanced dual frequency excitation:
  Size 25 to 200 mm (1.0 to 8.0 in.)
  (Optional code HF1 or HF2)

Input Signal (*1) "◇":
One Status Input: Dry contact
Load resistance: 200 Ω or less (ON), 100 kΩ or more (OFF)

Output Signals "◇":
- One Current Output: 4 to 20 mA DC (load resistance: 750 Ω maximum, including cable resistance)
- One Pulse Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
  Output rate: 0.0001 to 10,000 pps (pulse/second)
- One Alarm Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
- Two Status Outputs (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)

Communication Signals "◇":
BRAIN or HART communication signal
(Superimposed on the 4 to 20 mA DC signal)
Distance from power line: 15 cm (6 in.) or more (Parallel wiring should be avoided.)

BRAIN:

Communication Distance:
Up to 1.5 km (0.93 miles), when polyethylene insulated PVC-sheathed cables (CEV cables) are used.
Communication distance varies depending on the type of cable and wiring used.

Load Resistance:
250 to 450 Ω (including cable resistance)

Load Capacitance: 0.22 μF or less

Load Inductance: 3.3 mH or less

Input Impedance of Communicating Device:
10 kΩ or more (at 2.4 kHz)

HART:

Load Resistance:
250 to 600 Ω (including cable resistance)
Note: HART is a registered trademark of the HART Communication Foundation.

Data Security During Power Failure:
Data (parameters, totalizer value, etc.) storage by EEPROM. No back-up battery required.

Indicator (*2):
Full dot-matrix LCD (32×132 pixels)

Lightning Protector "◇":
The lightning protector is built into the excitation current output, the current output, the signal common, pulse/alarm/status input and output terminals. When optional code A is selected, the lightning protector is built into the power terminals.

Protection:
General-purpose Use/Sanitary Type/TIIS Flameproof type: IP66, IP67
Explosion proof type except TIIS:
In case of explosion proof type except TIIS, refer to description of "Enclosure" in "HAZARDOUS AREA CLASSIFICATION".

Coating:
Case and Cover: Corrosion-resistant coating
Coating Color; Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Converter Material:
Case and Cover: Aluminum alloy

Mounting/Shapes:
- Mounting: 2-inch pipe
- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 ×1.5 female
  JIS G1/2 (PF1/2) female
- Terminal Connection: M4 size screw terminal

Grounding:
Grounding resistance 100 Ω or less
When optional code A is selected, grounding resistance 10 Ω or less shall be applied.
* In case of explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.
* In case of TIIS Flameproof type, refer to description of "HAZARDOUS AREA CLASSIFICATION".

Combined Remote Flowtube:
- AXFA14 Converter can be combined with size 2.5 to 400 mm (0.1 to 16 in.) of AXF Remote Flowtube.
- If a combined converter is changed from AXFA14 to AXFA11 or vice versa, a new meter factor must be adjusted by flow calibrations.
- In case that size 250 mm (10 in.) or larger is used in low conductivity or high concentration slurries, please use the AXFA11 Converter.

Functions "◇"

How to Set Parameters (*2):
The indicator's LCD and three infra-red switches enable users to set parameters without opening the case cover. Parameters can also be set with the configuration tool (Such as HHT (handheld terminal) or FieldMate, etc.). The language for the HHT is English only.

Displayed Languages (*2):
Users can choose a language from among English, Japanese, German, French, Italian, Spanish.

Instantaneous Flow Rate/Totalized Value Display Functions (for models with an indicator) (*2):
The full dot-matrix LCD enables user selections of displays from one line to three lines for:
- Instantaneous flow rate
- Instantaneous flow rate (%)
- Instantaneous flow rate (bar graph)
- Current output value (mA)
- Totalized forward-direction flow rate
- Totalized reverse-direction flow rate
- Totalized differential flow rate
- Tag No.
- Results of electrode adhesion diagnostics
- Communication type

Totalizer Display Function (*2):
The flow rate is counted one pulse at a time according to the setting of totalization pulse weights. For forward and reverse flow measurement functions, the totalized values of the flow direction (forward or reverse) and the flow direction are displayed on the indicator together with the units. The difference of totalized values between the forward and reverse flow rate can be displayed. Totalization for the reverse flow rate is carried out only when "Forward and reverse flow measurement functions" is selected.

Damping Time Constant (*2):
Time constant can be set from 0.1 second to 200.0 seconds (63% response). The default is 3 seconds.

Span Setting Function (*2):
Span flows can be set in units such as volume flow rate, mass flow rate, time, or flow rate value. The velocity unit can also be set.
Volume Flow Rate Unit: kcf, cf, mcf, Mgal (US), kgal (US), gal (US), mgal (US), kbbl (US)*, bbl (US)*, mbbl (US)*, µbbl (US)*, Ml (megaliter), m^3, kl (kiloliter), l (liter), cm^3
Mass Flow Rate Unit (Density must be set.): klb (US), lb (US), t (ton), kg, g
Velocity Unit: ft, m (meter)
Time Unit: s (sec), min, h (hour), d (day)
* "US Oil" or "US Beer" can be selected.

Pulse Output (*1)(*2):
Scaled pulse can be output by setting a pulse weight.
Pulse Width: Duty 50% or fixed pulse width (0.05, 0.1, 0.5, 1, 20, 33, 50, 100 ms) can be selected.
Output Rate: 0.0001 to 10,000 pps (pulse/second)

Multi-range Function (*1)(*2):
- Range switching via status input
  Status input enables the switching of up to two ranges.
- Automatic range switching
  When the flow rate exceeds 100 % of the range, transition to the next range (up to four ranges) is carried out automatically. Range switching can be confirmed by status outputs and indicator.

Forward and Reverse Flow Measurement Functions (*1)(*2):
Flows in both forward and reverse directions can be measured. The reverse flow measurement can be confirmed by status output and indicator.

Totalization Switch (*1)(*2):
The status output is carried out when output if a totalized value becomes equal to or greater than the set value.

Preset Totalization (*1)(*2):
The parameter setting or status input enables a totalized value to be preset to a setting value or zero.

0% Signal Lock (*1)(*2):
Status input forcibly fixes the instantaneous flow rate display, current output, pulse output, and flow rate totalization to 0%.

Alarm Selection Function (*2):
Alarms are classified into System Alarms (hard failures), Process Alarms (such as 'Empty Pipe', 'Signal Overflow' and 'Adhesion Alarm'), Setting Alarms, and Warnings. Whether alarms should be generated or not can be selected for each item.
The current output generated for an alarm can be selected from among 2.4 mA or less, fixed to 4 mA, 21.6 mA or more, or HOLD.

Alarm Output (*1)(*2):
Alarms are generated only for the items selected via the 'Alarm Selection Function' if relevant failures occur.

Self Diagnostics Functions (*2):
If alarms are generated, details of the System Alarms, Process Alarms, Setting Alarms and Warnings are displayed together with concrete descriptions of countermeasures.

Flow Upper/Lower Limit Alarms (*1)(*2):
If a flow rate becomes greater or smaller than the set value, this alarm is generated. In addition, two upper limits (H, HH) and two lower limits (L, LL) can be set.
If a flow rate becomes greater or smaller than any of the set values, the status is output.

Electrode Adhesion Diagnostics Function (*1) (*2):
This function enables monitoring of the adhesion level of insulating substances to the electrodes. Depending on the status of adhesion, users are notified by a warning or an alarm via status outputs. If replaceable electrodes are used, they can be removed and cleaned when adhesion occurs.

■ HAZARDOUS AREA CLASSIFICATION

Refer to Chapter 12.

■ STANDARD PERFORMANCE

Accuracy (Combined with AXF Remote Flowtube)

Note: The accuracy of a product before shipment is defined as totalized value at the result of calibration test in our water actual flow test facility.
Calibrated conditions in our water actual test facility are as follows:

Fluid temperature;	20 ± 10°C
Ambient temperature;	20 ± 5°C
Length of straight runs;	10 D or more on the upstream side; 5 D or more on the downstream side
Reference conditions;	Similar to BS EN29104 (1993); ISO 9104 (1991)

Accuracy (Combined with AXF Remote Flowtube)

Pulse Output:

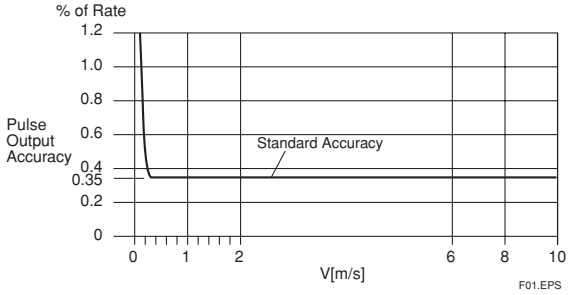
PFA/Ceramics Lining:

Size mm (in.)	Flow Velocity *V* m/s (ft/s)	Standard Accuracy (Calibration code B)	Flow Velocity *V* m/s (ft/s)	High grade Accuracy (Calibration code C)
2.5 (0.1) to 15 (0.5)	$V < 0.3$ (1)	±1.0 mm/s	—	
	$0.3 \leqq V \leqq 10$ (1) (33)	±0.35% of Rate		
25 (1.0) to 200 (8.0)	$V < 0.15$ (0.5)	±0.5 mm/s	$V < 0.15$ (0.5)	±0.5 mm/s
	$0.15 \leqq V \leqq 10$ (0.5) (33)	±0.35% of Rate	$0.15 \leqq V < 1$ (0.5) (3.3)	±0.18% of Rate ±0.2mm/s
			$1 \leqq V \leqq 10$ (3.3) (33)	±0.2% of Rate
250 (10) to 400 (16)	$V < 0.15$ (0.5)	±0.5 mm/s	—	
	$0.15 \leqq V \leqq 10$ (0.5) (33)	±0.35% of Rate		

T01.EPS

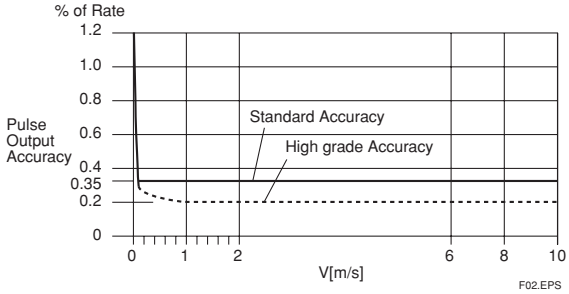
Enhanced dual frequency excitation (Option code HF2):
Standard accuracy ± 1 mm/ s

Size 2.5 mm (0.1 in.) to 15 mm (0.5 in.)



F01.EPS

Size 25 mm (1.0 in.) to 400 mm (16 in.)



F02.EPS

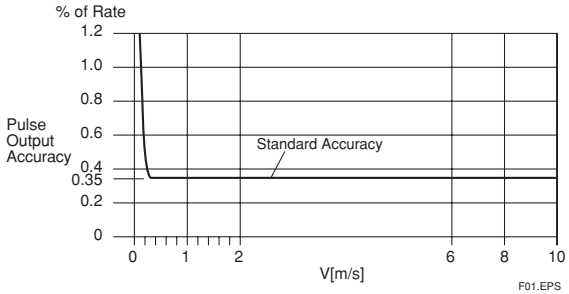
Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber Lining

Size mm (in.)	Flow Velocity *V* m/s (ft/s)	Standard Accuracy (Calibration code B)
25 (1.0) to 400 (16)	$V < 0.3$ (1.0)	±1.0 mm/s
	$0.3 \leqq V \leqq 10$ (1.0) (33)	±0.35% of Rate

T02.EPS

Enhanced dual frequency excitation (Optional code HF2):
Standard accuracy ± 1 mm/ s

Size 25 mm (1.0 in.) to 400 mm (16 in.)



F01.EPS

Current Output "◇": Pulse output accuracy plus ±0.05% of Span

Repeatability:
±0.1% of Rate (V ≧ 1 m/s (3.3 ft/s))
±0.05% of Rate ±0.5 mm/s (V < 1 m/s (3.3 ft/s))

Maximum Power Consumption:
Combined with AXF Remote Flowtube: 12 W

Insulation Resistance(*1) :
Between power supply terminals and ground terminal: 100MΩ at 500V DC
Between power supply terminals and input/output/ excitation current terminals : 100MΩ at 500V DC
Between ground terminal and input/output/excitation current terminals: 20MΩ at 100V DC
Between input/output/excitation current terminals :20MΩ at 100V DC

Withstand Voltage(*1) :
Between power supply terminals and groundterminal: 1390V AC for 2 seconds
Between power supply terminals and input/output terminals: 1390V AC for 2 seconds
Between excitation current terminal and ground terminal: 160V AC for 2 seconds
Between excitation current terminal and input /output terminals: 200V AC for 2 seconds

⚠ CAUTION

*1: When performing the Insulation Resistance Test or the Withstand Voltage Test, please obey the following caution.
- Following the relevant test, wait for more than 10 seconds after the power supply has been turned off before removing the cover.
- Remove all wires from terminals before testing.
- When the power terminal has a lighting protector (optional code A), remove the short bar at the ground terminal.
- After testing, be sure to discharge by using a resistance and return all wires and the short bar to its correct position.
- Screws must be tightened to a torque of 1.18 N-m or more.
- After closing the cover, the power supply can be restored.

Safety Requirement Standards:

EN61010-1

- Altitude at installation site: Max. 2000 m above sea level
- Installation category based on IEC1010:
  Overvoltage category II ("II" applies to electrical equipment which is supplied from a fixed installation-like distribution board.)
- Pollution degree based on IEC1010
  Pollution degree 2 ("Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to a normal indoor atmosphere.)

EMC Conformity Standards: CE , N200

EN61326-1 Class A, Table 2 (For use in industrial locations)
EN61326-2-3
EN61000-3-2 ClassA
EN61000-3-3

CAUTION

This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

■ NORMAL OPERATING CONDITIONS

Ambient Temperature: –40°C to +60°C (–40°F to +140°F)

- Indicator's operating range: –20°C to +60°C (–4°F to +140°F)
- Maximum temperature should be 50°C in the case of power supply code 2.

Ambient Humidity: 0 to 100%

Lengthy continuous operation at 95% or more is not recommended.

Power Supply

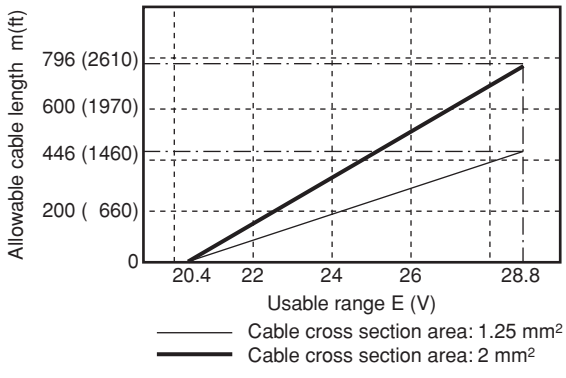
Power supply code 1:

- AC specifications
  Rated power supply: 100 to 240 V AC, 50/60 Hz
  (Operating voltage range: 80 to 264 V AC)
- DC specifications
  Rated power supply: 100 to 120 V DC
  (Operating voltage range: 90 to 130 V DC)

Power supply code 2:

- AC specifications
  Rated power supply: 24 V AC, 50/60 Hz
  (Operating voltage range: 20.4 to 28.8 V AC)
- DC specifications
  Rated power supply: 24 V DC
  (Operating voltage range: 20.4 to 28.8 V DC)

Supply Voltage and Cable Length for Power Supply Code 2



F04.EPS

Vibration Conditions:

Level of vibration in conformity with IEC 60068-2-6 (SAMA31. 1-1980)

9.8 m/s² or less (frequency of 500 Hz or less)

Note: Avoid locations with much vibration (with a vibration frequency of 500 Hz or more), which may cause damage to the equipment.

■ ACCESSORIES

Mounting bracket: 1 set
Hexagonal wrench: 1 pc.

■ MODEL AND SUFFIX CODE

AXFA14 Magnetic Flowmeter Remote Converter:

Model	Suffix Code	Description
AXFA14		Magnetic Flowmeter Remote Converter
Use (*2)	G	General-Purpose Use For AXF Remote Flowtube of Size 2.5 to 400 mm (0.1 in. to 16 in.)
	C	Explosion proof Type For Remote Flowtube of Size 2.5 to 400 mm (0.1 in. to 16 in.)
Output Signal and Communication	-D	4 to 20 mA DC, BRAIN Communication
	-E	4 to 20 mA DC, HART Communication
	-F	Digital communication (FOUNDATION Fieldbus protocol)(*5)
	-G	Digital communication (PROFIBUS PA protocol)(*6)
Power Supply	1	100 V to 240 V AC or 100 to 120 V DC
	2	24 V AC/DC
Electrical Connections (*3)	-0	JIS G1/2 female
	-2	ANSI 1/2 NPT female
	-4	ISO M20 × 1.5 female
Indicator (*1)(*4)	1	With Indicator (Horizontal)
	2	With Indicator (Vertical)
	N	None
Option	/□	Optional code (See the Table of Optional Specifications)

T03.EPS

*1: 1 2 N

*2: For explosion proof types, specify type of explosion proof certification using the optional codes. In case of the TIIS flameproof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flameproof type with wiring using a flameproof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 female electrical connections.
*3: JIS G1/2 female electrical connection is available only for TIIS flameproof type.
*4: In case of integral flowmeters of the TIIS flameproof type, select "with indicator"(code 1 or 2).
*5: For FOUNDATION Fieldbus protocol, refer to IM 01E20F02-01E
*6: For PROFIBUS PA protocol, refer to IM 01E20F12-01E

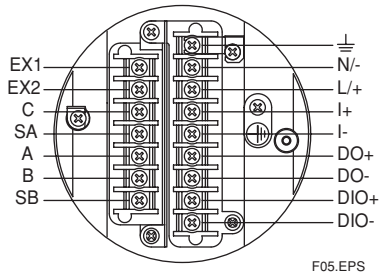
Signal Cable:

Model	Suffix Code	Description
AXFC	· · · · · · · · · · · · ·	Magnetic Flowmeter Dedicated Signal cable for the ADMAG AXF series
Termination	-0 · · · · · · · · · · · ·	No Termination.
	-4 · · · · · · · · · · · ·	A set of termination parts for M4 screws is attached. Terminated for the AXFA11/14 Remote Converter.
Cable Length	-L□□□ · · · · ·	Designate the cable length, unit: m Following "L", specify the cable in three digits as multiple of 1 meter (e.g., 001, 002, or 005) for a length up to 5 m, or as a multiple of 5 meters (i.e., 005, 010, 015, or the like). The maximum cable length: 200 m for combined use with AXFA11 100 m for combined use with AXFA14
Option	/C□	With termination parts sets. Following "C", specify the q'ty of sets of termination parts in one digits.

T04.EPS

Note:
- The cable is constructed with double shielding over the two conductors, and uses heat-resistant vinyl as the outer covering material.
  Finished diameture: 10.5 mm (0.41 in.)
  Maximum temperature: +80˚C (+175˚F)
- Unnecessary to order the above cable for submersible type flowtube or for the optional code DHC flowtube because the flowtube is wired with 30 m (98 ft) cable.
- For excitation cable, prepare a two-core cable at the customer side.

● Terminal Configuration "◇"



F05.EPS

● Terminal Wiring "◇"

Terminal Symbols	Description
EX1 EX2	Excitation current Output
C SA A B SB	Flow singal input

Terminal Symbols	Description
⏚	Functional grounding
N/– L/+	Power supply
I+ I–	Current output 4 to 20mA DC
DO+ DO–	Pulse output/ Alarm output/ Status output
DIO+ DIO–	Alarm output/ Status output/ Status input
⏚	Protective grounding (Outside of the terminal)

T06.EPS

■ OPTIONAL SPECIFICATIONS FOR AXFA14 REMOTE CONVERTER "◇"

○: Available –: Not available

Item	Specification		Applicable Model: General-Purpose use (AXF***G-D E F G)	Applicable Model: Explosion proof Type (AXF***C-D E F G)	Code
Lightning Protector	A lightning protector is built into the power terminals.		○	○	A
DC Noise Cut Circuit	The DC Noise Cut Circuit is built in. Available for 15 mm (0.5 in.) and larger sizes, and for fluids with the conductivity of 50 μS/cm or higher. Nullifies the empty check and electrode adhesion diagnostic function.		○	○	ELC
Burn Out Down	The output level is set to 0 mA during a CPU failure and is set 2.4 mA (-10%) or less during an alarm. Standard products are delivered with a setting 25 mA during a CPU failure and 21.6 mA (110%) or more during an alarm.		○ (*3)	○ (*3)	C1
NAMUR NE43 Compliance	Output signal limits: 3.8 to 20.5 mA	Failure alarm down-scale: The output level is set to 0 mA during a CPU failure and is set 2.4 mA (–10%) or less during an alarm.	○ (*3)	○ (*3)	C2
		Failure alarm up-scale. The output level is set to 25 mA during a CPU failure and is set 21.6 mA (110%) or more during an alarm.	○ (*3)	○ (*3)	C3
Active Pulse Output	Active pulses are output in order to drive an external electromagnetic or electronic counter directly using the converter's internal power supply. (Nullfies the standard transistor contact pulse output.) Output voltage: 24 V DC ±20% Pulse specifications: • The drive current of 150 mA or less • Pulse rate: 0.0001 to 2 pps (pulse/second); Pulse width: 20, 33, 50, or 100 ms		○ (*3)	○ (*3)	EM
Waterproof Glands	Waterproof glands are attached to the electrical connections. Available only for JIS G1/2 female electric connections.		○	–	EG
Waterproof Glands with Union Joints	Waterproof glands with union joints are attached to the electrical connections. Available only for JIS G1/2 female electric connections.		○	–	EU
Plastic Glands	Plastic glands are attached to the electrical connections. Available only for JIS G1/2 female electric connections.		○	–	EP
Stainless Steel Mounting Bracket	Provided with a JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel mounting bracket in lieu of the standard carbon steel bracket.		○	○	SB
Stainless Steel Tag Plate	Screwed JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel tag plate. Choose this option when an SS tag plate is required in addition to the standard nameplate with the tag number inscribed on it. Dimension (Height × Width): Appr. 12.5 (4.92) × 40 (15.7) mm (inch)		○	○	SCT
Painting Color Change	Coated in black (Munsell N1.5 or its equivalent.)		○	○	P1
	Coated in jade green (Munsell 7.5BG4/1.5 or its equivalent.)		○	○	P2
	Coated in metallic silver.		○	○	P7
Epoxy Resin Coating	Epoxy resin coating which has alkali-resistance instead of standard polyurethane resin coating. The color is same as standard type.		○	○	X1
High Anti-corrosion Coating	Three-layer coating (polyurethane coating on two-layer epoxy resin coating) in the same range as that for the standard coating. The color is same as standard type. Salt/alkali/acid/weather-resistance.		○	○	X2
Calibration Certificate	Level 2: The Declaration and the Calibration Equipment List are issued.		○	○	L2
	Level 3: The Declaration and the Primary Standard List are issued.		○	○	L3
	Level 4: The Declaration and the Yokogawa Measuring Instruments Control System are issued.		○	○	L4
FM Approval	FM Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	○	FF1
ATEX Certification	ATEX Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	○	KF2
CSA Certification	CSA Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	○	CF1
IECEx Certification *2	IECEx Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	○	SF2
TIIS Certification *1	TIIS Flameproof See "HAZARDOUS AREA CLASSIFICATION"		–	○	JF3

T05.EPS

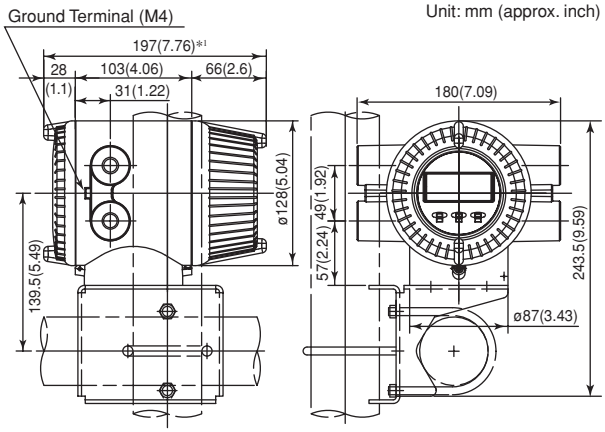
Item	Specification	Applicable Model		Code
		General-Purpose use	Explosion proof Type	
		D, E, F, G AXF***G-	D, E, F, G AXF***C-	
Flameproof packing adapter for TIIS Flameproof Type	Four flameproof packing adapters	–	○	G14
	Three flameproof packing adapters and one blind plug. Available only when a four-wires cable is used for power input and signal output with DC power supply.	–	○ (*3)	G13

*1: Select optional code G14 or G13 when TIIS Flameproof type with wiring using a flameproof packing adapter. Available only for JIS G1/2 female electric concections.
*2: Applicable only for Australia, New Zealand, Singapore and India.
*3: In the case of Fieldbus communication type, optional codes C1, C2, C3, EM and G13 are unable to select.

T05_02.EPS

■ EXTERNAL DIMENSIONS

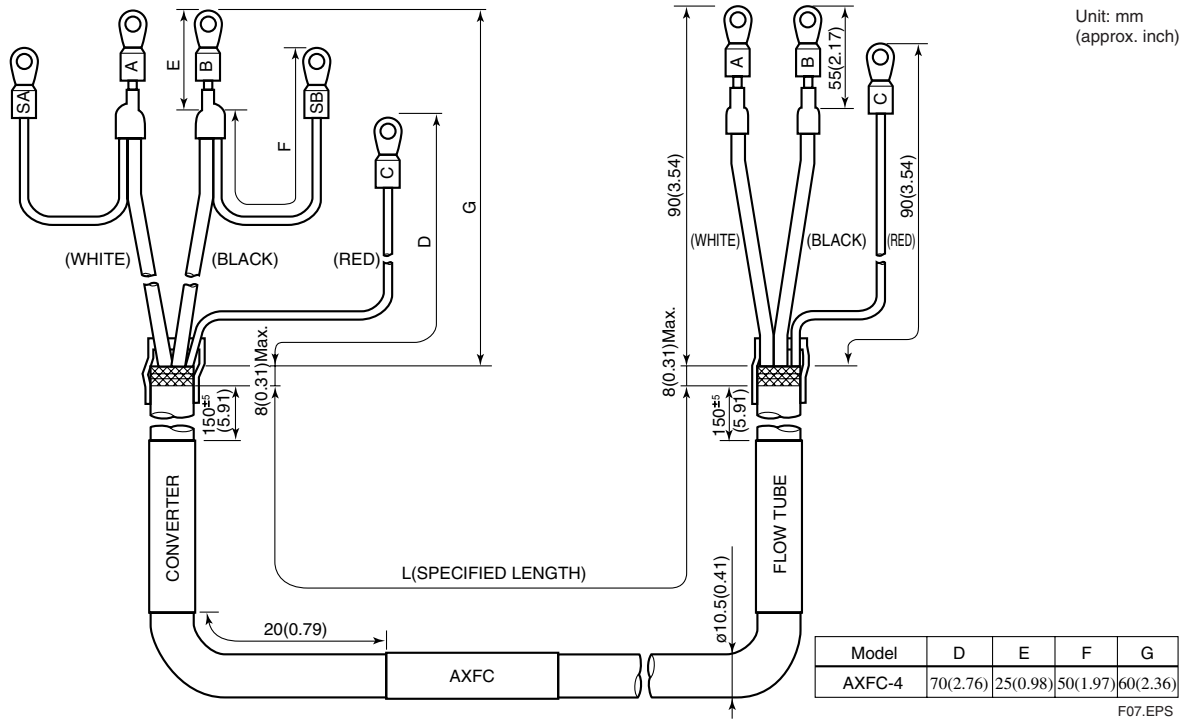
● Remote Converter AXFA14G/C



*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it. F06.EPS

● Dedicated Signal Cable

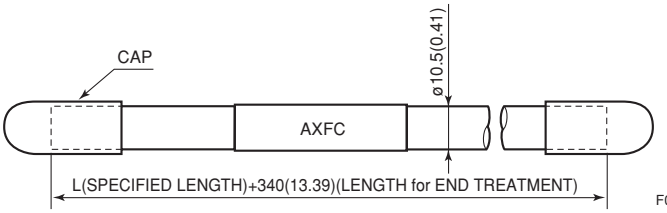
AXFC-4-L□□□



Model	D	E	F	G
AXFC-4	70(2.76)	25(0.98)	50(1.97)	60(2.36)

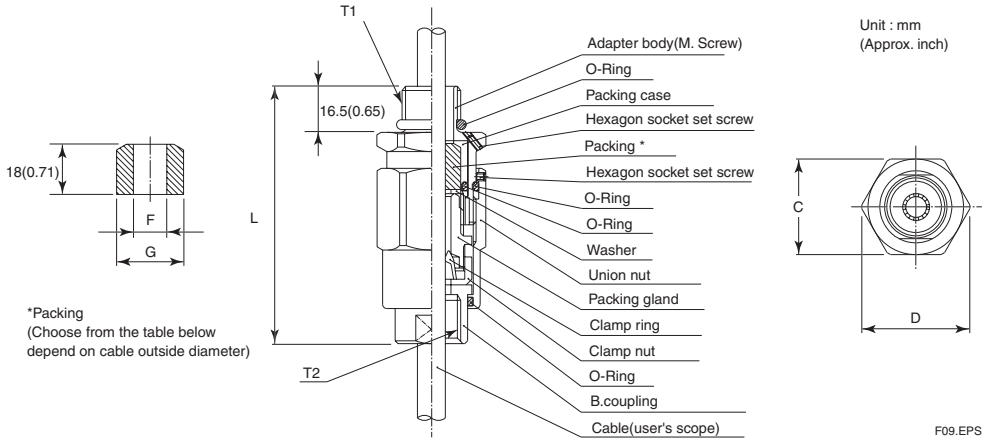
F07.EPS

AXFC-0-L□□□



F08.EPS

● Flameproof packing adapter for TIIS Flameproof type (optional code G14 or G13)



Dimension					Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ø8.0 to ø10.0 (0.31 to 0.39)	ø10.0(0.39)	ø20.0 (0.79)	16 8-10	0.26 (0.57)
					ø10.0 to ø12.0 (0.39 to 0.47)	ø12.0(0.47)		16 10-12	

T013.EPS

● Unless otherwise specified, difference in the dimensions are refer to the following table.

General tolerance in the dimensional outline drawing.

Unit : mm (approx.inch)

Category of basic dimension		Tolerance	Category of basic dimension		Tolerance
Above	Equal or below		Above	Equal or below	
	3 (0.12)	±0.7 (±0.03)	500 (19.69)	630 (24.80)	±5.5 (±2.17)
3 (0.12)	6 (0.24)	±0.9 (±0.04)	630 (24.80)	800 (31.50)	±6.25 (±0.25)
6 (0.24)	10 (0.39)	±1.1 (±0.04)	800 (31.50)	1000 (39.37)	±7.0 (±0.28)
10 (0.39)	18 (0.71)	±1.35 (±0.05)	1000 (39.37)	1250 (49.21)	±8.25 (±0.32)
18 (0.71)	30 (1.18)	±1.65 (±0.06)	1250 (49.21)	1600 (62.99)	±9.75 (±0.38)
30 (1.18)	50 (1.97)	±1.95 (±0.08)	1600 (62.99)	2000 (78.74)	±11.5 (±0.45)
50 (1.97)	80 (3.15)	±2.3 (±0.09)	2000 (78.74)	2500 (98.43)	±14.0 (±0.55)
80 (3.15)	120 (4.72)	±2.7 (±0.11)	2500 (98.43)	3150 (124.02)	±16.5 (±0.65)
120 (4.72)	180 (7.09)	±3.15 (±0.12)			
180 (7.09)	250 (9.84)	±3.6 (±0.14)			
250 (9.84)	315 (12.40)	±4.05 (±0.16)			
315 (12.40)	400 (15.75)	±4.45 (±0.18)			
400 (15.75)	500 (19.69)	±4.85 (±0.19)			

Remarks: The numeric is based on criteria of tolerance class IT18 in JIS B 0401.

12. EXPLOSION PROTECTED TYPE INSTRUMENT

In this section, further requirements and differences for explosion proof type instrument are described.

WARNING

- Magnetic flowmeters with the model name AXFA14C are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations.
  Be sure to read this chapter before handling the instruments.
  For explosion proof type instrument, the description in this chapter is prior to other description in this user's manual.
  For TIIS flameproof type instruments, be sure to read "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT" at the end of this manual.

WARNING

The terminal box cover and display cover is locked by special screw. In case of opening the cover, please use the hexagonal wrench attached.
The covers of explosion proof type products are locked. Use the attached hexagonal wrench to open and close the cover. Before opening the cover, be sure to check that the power of flowmeter has been turned off. Once the cover is closed, be sure to re-lock the product.
Be sure to lock the cover with the special screw using the hexagonal wrench attached after tightening the cover.

12.1 ATEX

WARNING

Only trained persons use this instrument in industrial locations.

(1) Technical Data

Applicable Standard:
EN 50014: 1997, EN 50018: 2000,
EN 50281-1-1: 1998
Certificate: KEMA 03ATEX2435

ATEX Flameproof Type

Group: II
Category: 2G
EEx d IIC T6
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

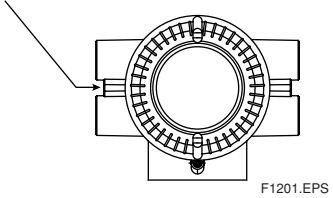
ATEX Type of Protection "Dust"

Group: II
Category: 1D
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Maximum surface temperature: T75°C (+167°F)
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Electrical Connection

The type of electrical connection is stamped near the electrical connection port accordiing to the following codes.

Screw Size	Marking
ISO M20x1.5 female	⚠ M
ANSI 1/2NPT female	⚠ A



F1201.EPS

(3) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified ATEX flameproof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements. (The plug attached is flameproof certified.)

(4) Operation

WARNING

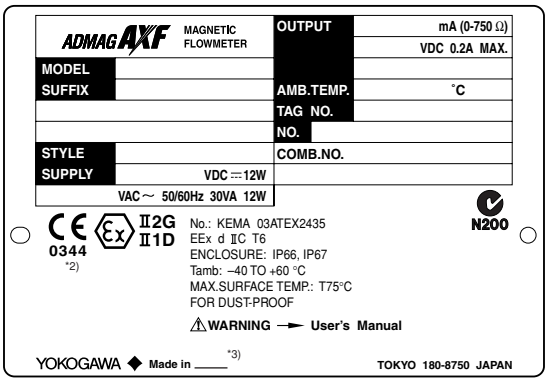
- After de-energizing, delay 20 minutes before opening.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(5) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(6) Data Plate



MODEL: Specified model code
SUFFIX: Suffix codes of the model code
STYLE: Specified style code
SUPPLY: Power supply voltage of apparatus
OUTPUT: Output signal of apparatus
AMB. TEMP., Tamb: Ambient temperature
No.: Manufacturing serial number *1)

CE: CE marking
II 2G: Group II Category 2 Gas atmosphere
II 1D: Group II Category 1 Dust atmosphere
No.: KEMA 03ATEX2435:
EC Type Examination certificate number
EEx d IIC T6: Protection type and temp. class
ENCLOSURE: Enclosure protection code

WARNING: Warning to apparatus
YOKOGAWA ◆ TOKYO 180-8750 JAPAN :
Name and address of manufacturer

*1) The third figure from the last shows the last one figure of the year of production. For example, the year of production of the product engraved as follows is year 2005.
No. S5EA05158 5̲45
↑
Produced in 2005

*2) The identification number of the notified body:
0344 KEMA Netherland

*3) The product-producing country

12.2 FM

(1) Technical Data

Applicable Standard:
FM3600, FM3615, FM3810, ANSI/NEMA 250
Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: NEMA 4X
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

WARNING

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and Local Electrical Code.
- In hazardous locations, wiring to be in conduit as shown in Figure 12.2.1.
- When installed in Division 2, "SEALS NOT REQUIRED"

(3) Operation

WARNING

- "OPEN CIRCUIT BEFORE REMOVING COVERS."
- "SEAL ALL CONDUITS WITHIN 18 INCHES" in hazardous locations.
- When installed in Division 2, "SEALS NOT REQUIRED"
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the approval of Factory Mutual Research Corporation.

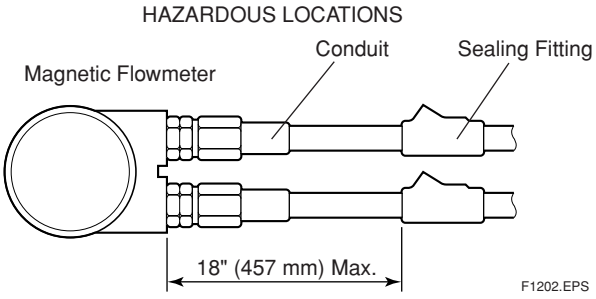


Figure 12.2.1 Conduit Wiring

12.3 CSA

(1) Technical Data

Applicable Standard:

For CSA C22.2 Series;

C22.2 No 0, C22.2 No 0.4, C22.2 No 0.5, C22.2 No 25, C22.2 No 30, C22.2 No 94, C22.2 No 1010.1

For CSA E79 Series;

CAN/CSA-E79-0, CAN/CSA-E79-1,

Certificate: 1481213

For CSA C22.2 Series

Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: Type 4X
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

For CSA E79 Series

Flameproof for Zone 1, Ex d IIC T6

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

For CSA C22.2 Series

WARNING

- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- In hazardous location, wiring shall be in conduit as shown in Figure 12.3.1.

WARNING : SEAL ALL CONDUITS WITHIN 50cm OF THE ENCLOSURE'.
UN SCELLEMENT DOIT ÉTRE INSTALLÉ À MOINS DE 50cm DU BOÎTIER.

- When installed in Division 2, "SEALS NOT REQUIRED"

For CSA E79 Series

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified flameproof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements. (The plug attached is flameproof certified.)

(3) Operation

For CSA C22.2 Series

WARNING

WARNING : OPEN CIRCUIT BEFORE REMOVING COVER.
OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE.

- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous location.

For CSA E79 Series

WARNING

WARNING : AFTER DE-ENERGIZING, DELAY 20 MINUTES BEFORE OPENING.
APRÉS POWER-OFF, ATTENDRE 20 MINUTES AVANT D'OUVRIR.

- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of YOKOGAWA Electric Corporation or YOKOGAWA Corporation of AMERICA is prohibited and will void Canadian Standards Explosionproof Certification.

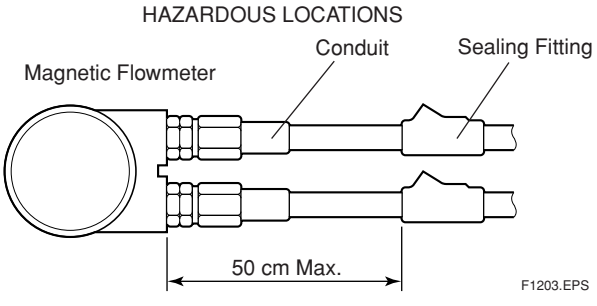


Figure 12.3.1 Conduit Wiring

12.4 IECEx

WARNING

Only trained persons use this instrument in industrial locations.

(1) Technical Data

Applicable Standard:
IEC60079-0: 2004, IEC60079-1: 2003,
IEC61241-0: 2004, IEC61241-1: 2004,
IEC60529: 1999 + Edition 2.1: 2001
Certificate: IECEx KEM 05.0018

IECEx Flameproof Type

Ex d IIC T6
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

IECEx Type of Protection "Dust"

Ex tD A21 IP6x T95°C
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Maximum surface temperature: T95°C (+203°F)
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified IECEx flameproof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements. (The plug attached is certified as the flameproof and IP66 or IP67 as a part of this apparatus.)
- In case of ANSI 1/2 NPT plug, ANSI hexagonal wrench should be applied to screw in.

(3) Operation

WARNING

- After de-energizing, delay 20 minutes before opening.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

12.5 TIIS

CAUTION

The model AXFA14C magnetic flowmeter remote converter with optional code JF3, which has obtained certification according to technical criteria for explosion-protected construction of electric machinery and equipment (Standards Notification No. 556 from the Japanese Ministry of Labor) conforming to IEC standards, is designed for hazardous areas where inflammable gases or vapors may be present. (This allows installation in Division 1 and 2 areas)
To preserve the safety of flameproof equipment requires great care during mounting, wiring, and piping. Safety requirements also place restrictions on maintenance and repair activities. Users absolutely must read “INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT” at the end of this manual.

(1) Technical Data

- Certificate: TC16678
- Construction: Ex d IIC T6
  : Explosion proof
- Ignition and Explosion Class of gas or vapour: IIC T6
- Ambient Temperature: –20 to 60°C (power supply code 1)
  : –20 to 50°C (power supply code 2)
- Maximum power supply voltage: 250V AC/130V DC
- Grounding: JIS Class C(grouding resistance 10Ω or less) or JIS Class A(grounding resistance 10Ω or less)

WARNING

In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

WARNING

* In case of TIIS Flameproof type, a remote flowtube is available for combined use with the AXFA14 only.

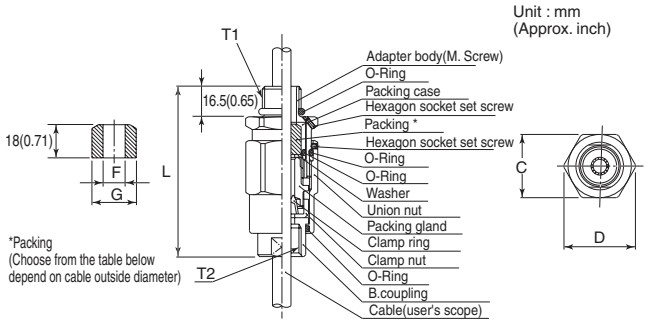
(2) Wiring Installation

For the external wiring of flameproof types, use a flameproof packing adapter approved by Yokogawa (refer to Figure 12.4.2) or cable wiring using a flameproof metal conduit (refer to Figure 12.4.4 and “INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT” at the end of this manual).

(2-1) Wiring Cable through Flameproof Packing Adapter

WARNING

For the TIIS flameproof type with wiring using a flameproof packing adapter, wire cables through the packing adapters approved by Yokogawa (optional code G14 or G13).



Dimension					Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ϕ8.0 to ϕ10.0 (0.31 to 0.39)	ϕ10.0(0.39)	ϕ20.0 (0.79)	16 8-10	0.26 (0.57)
					ϕ10.0 to ϕ12.0 (0.39 to 0.47)	ϕ12.0(0.47)		16 10-12	

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Figure 12.4.1 Flameproof Packing Adapter

- Apply a nonhardening sealant to the terminal box connection port and to the threads on the flameproof packing adapter for waterproofing.
- The same wiring as described below is required for all of the terminal box connection ports except when a four-wire cable is used for power input and signal output with DC power supply.

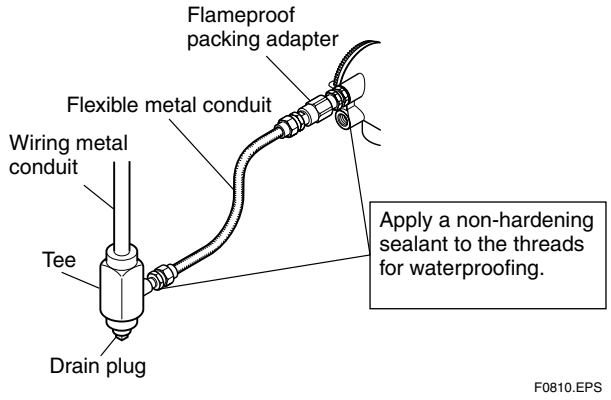

Figure 12.4.2 Typical Wiring Using Flexible Metal Conduit

Follow the procedure for flameproof packing adapter setting. (refer to Figure 12.4.3)

CAUTION

Before fighting, confirm cable length from terminal to flameproof packing adapter when setting. Once it is tightened, loosening and re-tightening may damage its sealing performance.

(a) Loosen the locking screw and remove the terminal box cover.
(b) Measure the cable outer diameter in two directions to within 0.1 mm.
(c) Calculate the average of the two diameters, and use packing with an internal diameter nearest to this value (see Table 12.4.1).
(d) Screw the flameproof packing adapter into the terminal box until the O-ring touches the wiring port (at least 6 full turns), and firmly tighten the lock nut.
(e) Insert the cable through the union cover, the union coupling, the clamp nut, the clamp ring, the gland, the washer, the rubber packing, and the packing box, in that order.
(f) Insert the end of the cable into the terminal box.
(g) Tighten the union cover to grip the cable. When tightening the union cover, tighten approximately one turn past the point where the cable will no longer move up and down.
Proper tightening is important. If it is too tight, a circuit break in the cable may occur; if not tight enough, the flameproof effectiveness will be compromised.
(h) Fasten the cable by tightening the clamp nut.
(i) Tighten the lock nut on the union cover.
(j) Connect the cable wires to each terminal.

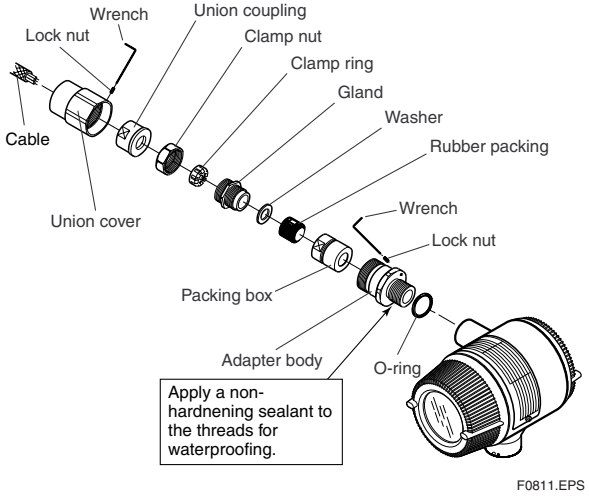

Figure 12.4.3 Installing Flameproof Packing Adapter

(2-2) Cable Wiring Using Flameproof Metal Conduit

- A seal fitting must be installed near the terminal box connection port for a sealed construction.
- Apply a non-hardening sealant to the threads of the terminal box connection port, flexible metal conduit and seal fitting for waterproofing.
- The same wiring as described below is required for all of the terminal box connection ports except when a four-wire cable is used for power input and signal output with DC power supply.

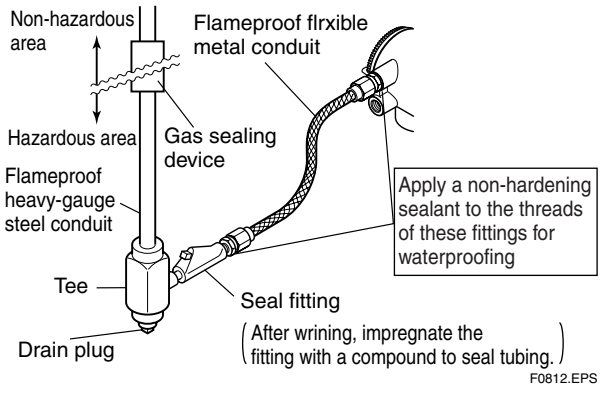

Figure 12.4.4 Typical Wiring Using Flameproof Metal Conduit

INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT

Apparatus Certified Under Technical Criteria
(IEC-compatible Standards)

1. General

The following describes precautions on electrical apparatus of flameproof construction (hereinafter referred to as flameproof apparatus) in explosion-protected apparatus.

Following the Labour Safety and Health Laws of Japan, flameproof apparatus is subjected to type tests to meet either the technical criteria for explosionproof electrical machinery and equipment (standards notification no. 556 from the Japanese Ministry of Labour) (hereinafter referred to as technical criteria), in conformity with the IEC Standards, or the “Recommended Practice for Explosion-Protected Electrical Installations in General Industries,” published in 1979. These certified apparatus can be used in hazardous locations where explosive or inflammable gases or vapours may be present.

Certified apparatus includes a certification label and an equipment nameplate with the specifications necessary for explosion requirements as well as precautions on explosion protection. Please confirm these precautionary items and use them to meet specification requirements.

For electrical wiring and maintenance servicing, please refer to “Internal Wiring Rules” in the Electrical Installation Technical Standards as well as “USER’S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry,” published in 1994.

To meet flameproof requirements, equipment that can be termed “flameproof” must:

(1) Be certified by a Japanese public authority in accordance with the Labour Safety and Health Laws of Japan and have a certification label in an appropriate location on its case, and
(2) Be used in compliance with the specifications marked on its certification label, equipment nameplate and precautionary information furnished.

2. Electrical Apparatus of Flameproof Type of Explosion-Protected Construction

Electrical apparatus which is of flameproof construction is subjected to a type test and certified by the Japanese Ministry of Labour aiming at preventing explosion caused by electrical apparatus in a factory or any location where inflammable gases or vapours may be present. The flameproof construction is of completely enclosed type and its enclosure shall endure explosive pressures in cases where explosive gases or vapours entering the enclosure cause explosion. In addition, the enclosure construction shall be such that flame caused by explosion does not ignite gases or vapours outside the enclosure.

In this manual, the word "flameproof" is applied to the flameproof equipment combined with the types of protection "e", "o", "i", and "d" as well as flameproof equipment.

3. Terminology

(1) Enclosure

An outer shell of an electrical apparatus, which encloses live parts and thus is needed to configure explosion-protected construction.

(2) Shroud

A component part which is so designed that the fastening of joint surfaces cannot be loosened unless a special tool is used.

(3) Enclosure internal volume

This is indicated by:— the total internal volume of the flameproof enclosure minus the volume of the internal components essential to equipment functions.

(4) Path length of joint surface

On a joint surface, the length of the shortest path through which flame flows from the inside to outside of the flameproof enclosure. This definition cannot be applied to threaded joints.

(5) Gaps between joint surfaces

The physical distance between two mating surfaces, or differences in diameters if the mating surfaces are cylindrical.

Note: The permissible sizes of gaps between joint surfaces, the path length of a joint surface and the number of joint threads are determined by such factors as the enclosure’s internal volume, joint and mating surface construction, and the explosion classification of the specified gases and vapours.

4. Installation of Flameproof Apparatus

(1) Installation Area

Flameproof apparatus may be installed, in accordance with applicable gases, in a hazardous area in Zone 1 or 2, where the specified gases are present. Those apparatus shall not be installed in a hazardous area in Zone 0.

Note: Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:
Zone 0: An area in which an explosive gas atmosphere is present continuously or is present for long periods.
Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation.
Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(2) Environmental Conditions

The standard environmental condition for the installation of flameproof apparatus is limited to an ambient temperature range from –20°C to +40°C (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to +60°C as indicated on the instrument nameplates. If the flameproof apparatus are exposed to direct sunshine or radiant heat from plant facilities, appropriate thermal protection measures shall be taken.

5. External Wiring for Flameproof Apparatus

Flameproof apparatus require cable wiring or flameproof metal conduits for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. For metal conduits, attach sealing fittings as close to wiring connections as possible and completely seal the apparatus. All non-live metal parts such as the enclosure shall be securely grounded. For details, see the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

(1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.
- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated form Zone 1 or 2 hazardous location to any different location or non-hazardous location through the protective pipe or duct, apply sealing of the protective pipes in the vicinity of individual boundaries, or fill the ducts with sand appropriately.
- When branch connections of cables, or cable connections with insulated cables inside the conduit pipes are made, a flameproof or increased-safety connection box shall be used. In this case, flameproof or increased-safety cable glands meeting the type of connection box must be used for cable connections to the box.

(2) Flameproof Metal Conduit Wiring

- For the flameproof metal conduit wiring or insulated wires shall be used as recommended by the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry, published in 1994.
- For conduit pipes, heavy-gauge steel conduits conforming to JIS C 8305 Standard shall be used.
- Flameproof sealing fittings shall be used in the vicinity of the wiring connections, and those fittings shall be filled with sealing compounds to complete sealing of the apparatus. In addition, to prevent explosive gases, moisture, or flame caused by explosion form being propagated through the conduit, always provide sealing fittings to complete sealing of the conduit in the following locations:
  (a) In the boundaries between the hazardous and non-hazardous locations.
  (b) In the boundaries where there is a different classification of hazardous location.
- For the connections of the apparatus with a conduit pipe or its associated accessories, G-type parallel pipe threads (JIS B 0202) shall be used to provide a minimum of five-thread engagement to complete tightness. In addition, since these parallel threads do not have sealing property, nonhardening sealant such as liquid gaskets shall thus be applied to those threads for ensuring waterproofness.
- If metal conduits need flexibility, use flameproof flexible fittings.

6. Maintenance of Flameproof Apparatus

To maintain the flameproof apparatus, do the following. (For details, see Chapter 10 "MAINTENANCE OF EXPLOSION-PROTECTED ELECTRICAL INSTALLATION" in the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry.)

(1) Maintenance servicing with the power on.

Flameproof apparatus shall not be maintenance-serviced with its power turned on. However, in cases where maintenance servicing is to be conducted with the power turned on, with the equipment cover removed, always use a gas detector to check that there is no explosive gas in that location. If it cannot be checked whether an explosive gas is present or not, maintenance servicing shall be limited to the following two items:

(a) Visual inspection
Visually inspect the flameproof apparatus, metal conduits, and cables for damage or corrosion, and other mechanical and structural defects.

(b) Zero and span adjustments
These adjustments should be made only to the extent that they can be conducted from the outside without opening the equipment cover. In doing this, great care must be taken not to cause mechanical sparks with tools.

(2) Repair

If the flameproof apparatus requires repair, turn off the power and transport it to a safety (non-hazardous) location. Observe the following points before attempting to repair the apparatus.

(a) Make only such electrical and mechanical repairs as will restore the apparatus to its original condition. For the flameproof apparatus, the gaps and path lengths of joints and mating surfaces, and mechanical strength of enclosures are critical factors in explosion protection. Exercise great care not to damage the joints or shock the enclosure.

(b) If any damage occurs in threads, joints or mating surfaces, inspection windows, connections between the transmitter and terminal box, shrouds or clamps, or external wiring connections which are essential in flameproofness, contact Yokogawa Electric Corporation.

⚠ CAUTION

Do not attempt to re-process threaded connections or refinish joints or mating surfaces.

(c) Unless otherwise specified, the electrical circuitry and internal mechanisms may be repaired by component replacement, as this will not directly affect the requirements for flameproof apparatus (however, bear in mind that the apparatus must always be restored to its original condition). If you attempt to repair the flameproof apparatus, company-specified components shall be used.

(d) Before starting to service the apparatus, be sure to check all parts necessary for retaining the requirements for flameproof apparatus. For this, check that all screws, bolts, nuts, and threaded connections have properly been tightened.

(3) Prohibition of specification changes and modifications

Do not attempt to change specifications or make modifications involving addition of or changes in external wiring connections.

7. Selection of Cable Entry Devices for Flameproof Type

⚠ CAUTION

The cable glands (cable entry devices for flameproof type) conforming to IEC Standards are certified in combination with the flameproof apparatus. So, Yokogawa-specified cable entry devices for flameproof type shall be used to meet this demand.

References:

(1) Type Certificate Guide for Explosion-Protected Construction Electrical Machinery and Equipment (relating to Technical Standards Conforming to International Standards), issued by the Technical Institution of Industrial Safety, Japan

(2) USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry (1994), issued by the Japanese Ministry of Labour, the Research Institute of Industrial Safet

REVISION RECORD

Title: AXFA14G/C Magnetic Flowmeter Remote Converter
[Hardware Edition/Software Edition]
AXF Magnetic Flowmeter Integral Flowmeter [Software Edition]
Manual No.: IM 01E20C02-01E

Edition	Date	Page		Revised Item
6th	Oct. 2005	6-3 to 6-7	6.3	Corrected the data range from "0.00001" to "0.0001".(B23, C42, C49, F30 to F34) Corrected the position of decimal point from "0 to 5" to "0 to 4". (B23, B31, B33, C42, C46, C49, D11, E11, F30 to F34)" "Corrected the position of decimal point from "0 to 5" to "0 to 2".(C32)
		11-3		Added the "IECEx" to the hazardous area classification.
		11-7	SF2	Added the "IECEx Certification (SF2)" to the optional specifications.
		12-4	12.4	Added the "IECEx".
7th	June 2006	1-1		Added the postscript about FOUNDATION Fieldbus protocol type.
		4-4	4.4.2	Added the postscript about FOUNDATION Fieldbus protocol type.
		4-7	4.4.6 (2)	Added the “IECEx”.
			4.4.7	Added the postscript about FOUNDATION Fieldbus protocol type.
		4-7		Added the important note on pulse rate range of active pulse output.
		5-1		Added the important note on “write protect”.
		7-3	7.2.1	Added the important note on “write protect”.
		8-1		Added the important note on “write protect”.
		10-3	10.1.3	Added the postscript about FOUNDATION Fieldbus protocol type.
		10-4	10.2.1	Added the postscript about FOUNDATION Fieldbus protocol type.
			10.2.2	Added the postscript about FOUNDATION Fieldbus protocol type.
		11-1,2		Added the postscript about FOUNDATION Fieldbus protocol type.
		11-4 to 8		Added the postscript about FOUNDATION Fieldbus protocol type.
		11-5		Added the “-F” (FOUNDATION Fieldbus protocol)
8th	May 2007	1-2	(4)	Changed the warning note of "Maintenance".
		1-3	1.3	Added the IECEx to CAUTION.
		1-5	1.4	Added the ATEX documentation.
		4-3	4.3	Added the important note for the wiring ports.
		4-5	4.4.4	Added the important note for a 24 V power supply version (power supply code 2). Corrected the graph of "Supply Voltage and Cable Length".
		5-1		Changed the "SET", "SHIFT" and "▼" from character to figure.
		5-3	5.2	Corrected the flow chart. Changed the note of entry mode. Added the NOTE for display unit setting.
		5-4 to 5-6, 5-8, 5-9, 9-2, 9-4		Added the NOTE for display unit setting.
		6-30 to 6-31	J10, J11, J12	Added the sentence about indications action of display unit.
		6-32	J31	Added the parameter setting table for "Power supply code 2".
		8-2	8.1.2	Deleted the section of "Communication Line Requirements".
		10-1	10.1	Changed the warning note and important note of "Maintenance".
			10.1.1	Changed the caution note of "Fuse Replacement". Deleted the Figure 10.1.1.
		10-2	10.1.2	Changed the content of section "Display Unit Replacement" to "Changing the Direction of the Display Unit".
		10-3	10.1.3	Deleted the section "Display Unit Replacement" and section "Amplifier Replacement".
		10-4	10.2	Added the important note for "Setting of Switches".
		11-1		Deleted the "Communication Distance" and "Cable length for Specific Applications" from item of "HART". Added the "Mounting" to item of "Mounting/Shapes".
		11-3		Changed the certificate number of TIIS.
		11-5		Corrected the graph of "Supply Voltage and Cable Length for Power Supply Code 2".-
		11-7		Added the note to optional codes C1, C2, C3, EM, and G13.
		12-4		Added the "Excitation Circuit" to "IECEx Flameproof Type".
		12-5	12.5(1)	Changed the certificate number of TIIS.

Edition	Date	Page		Revised Item
9th	Jan. 2008	1-1		Added the postscript about PROFIBUS PA protocol type.
		1-2	1.1	Added the warning note on "write protect".
		4-4	4.4.2	Added the postscript about PROFIBUS PA protocol type.
		4-7	4.4.7	Added the postscript about PROFIBUS PA protocol type.
		5-1	5	Added the postscript about FOUNDATION Fieldbus protocol type and PROFIBUS PA protocol type.
				Added the warning note on "write protect".
		6-1	6.1	Added the postscript about FOUNDATION Fieldbus protocol type and PROFIBUS PA protocol type.
		7-3	7.2.1	Added the warning note on "write protect". Corrected the Figure 7.2.
		8-1	8	Added the warning note on "write protect".
		9-1	9	Added the postscript about FOUNDATION Fieldbus protocol type and PROFIBUS PA protocol type.
		9-3	9.1.2	Corrected the characters.
		10-4	10.3.1	Changed the flow chart.
		11-1		Added the postscript about PROFIBUS PA protocol type.
				Corrected the frequency of "Input Impedance of Communicating Device".
		11-4		Added the CAUTION to "EMC Conformity Standard".
		11-5		Changed the unit of "Vibration Conditions" from "G" to "m/s^2".
				Added the "-G" (PROFIBUS PA protocol).

Edition	Date	Page		Revised Item
10th	June 2012	1-3		Added the "Trademarks".
		2-1	2.2	Deleted the fuse from item of accessories.
		4-2	(2)	Added the recomended cable.
		4-3	4.3	Deleted the sentence of JIS C0920 standard.
				Corrected the Figure 4.3.1 and added two washers.
				Corrected the Figure 4.3.3 and added a gasket.
		4-8	4.4.7	Corrected the current range of Figure 4.4.9.
		5-1	5	Added the explanatory sentence of infra-red switches.
		5-4		Corrected the figures.
		6-11	P23	Added the "keep" to default value.
		6-14	B33	Corrected the unit from "M Unit/P" to "k Unit/P" of Exsample 1.
		6-29	G40, G42	Added the important note.
		7-3	7.2	Changed the IM number of BT200.
			7.2.1	Corrected the value of maximum receiving resistance of Figure 7.2.
		7-4	7.2.1 (3)	Changed the IM number of BT200.
		8-1 to 8-16	8	Changed the explanation of HART.
		10-1	10.1.1	Changed the caution note.
		11-1	11	Corrected the communication distance and the value of maximum load resistance of BRAIN.
				Changed the value of minimum load resistance of HART.
				Deleted the type by JIS C0920 of protection.
				Changed the kind of coating.
		11-2		Corrected item names of instantaneous flow rate/totalized value display functions.
				Added the default value of damping time constant.
				Abbreviated the HAZARDOUS AREA CLASSIFICATION.
				Changed the definition of accuracy.
		11-4		Changed the numbers of EMC conformity standards.
				Deleted the fuse from item of accessories.
		11-6		Corrected the current range of /EM.
		11-7	*2	Added the Singapore and India to applicable country of /SF2.
		12-1	12.1 (1)	Added the year to applicable standard numbers of CENELEC ATEX.